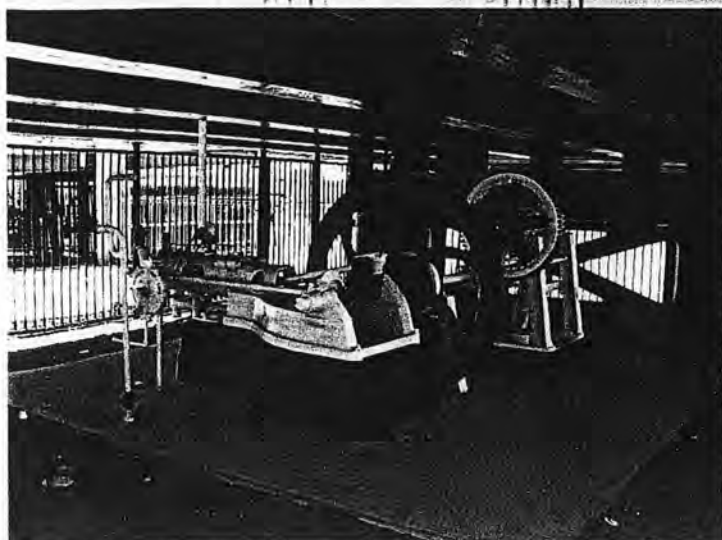
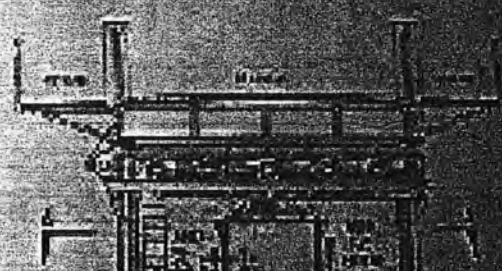
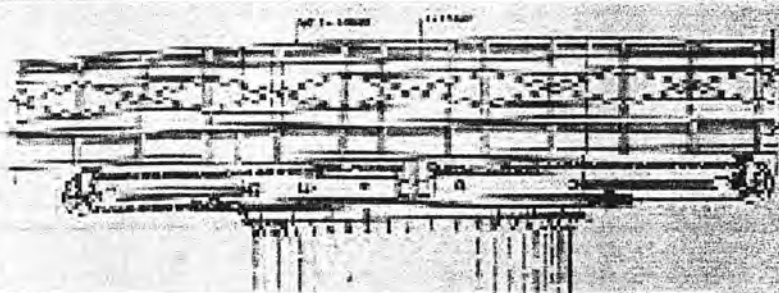


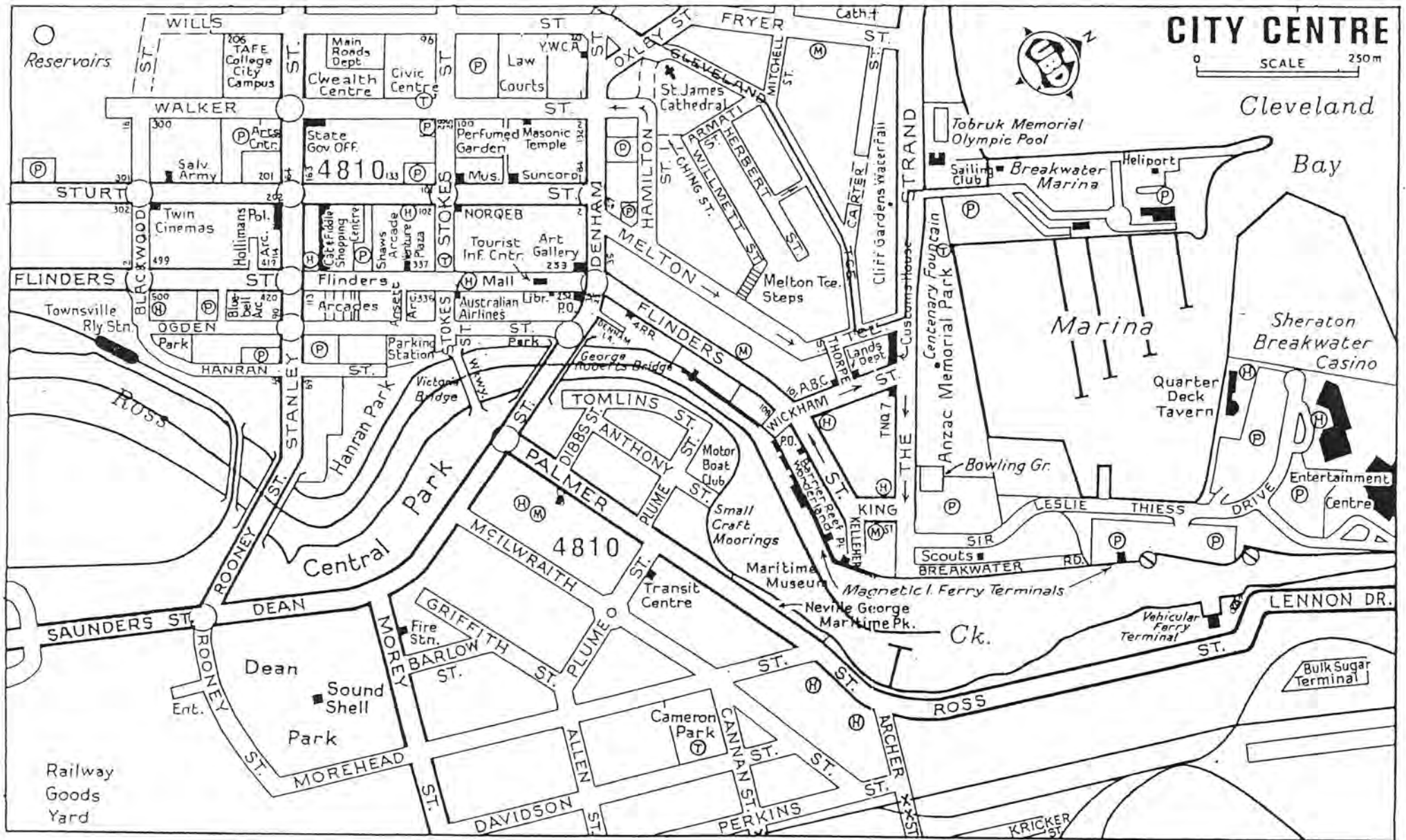
NOMINATION OF VICTORIA SWING BRIDGE TOWNSVILLE FOR AN HISTORIC ENGINEERING MARKER



Prepared by
Chris Martin
For the Townsville
Local Group
Engineers Australia
February 2003

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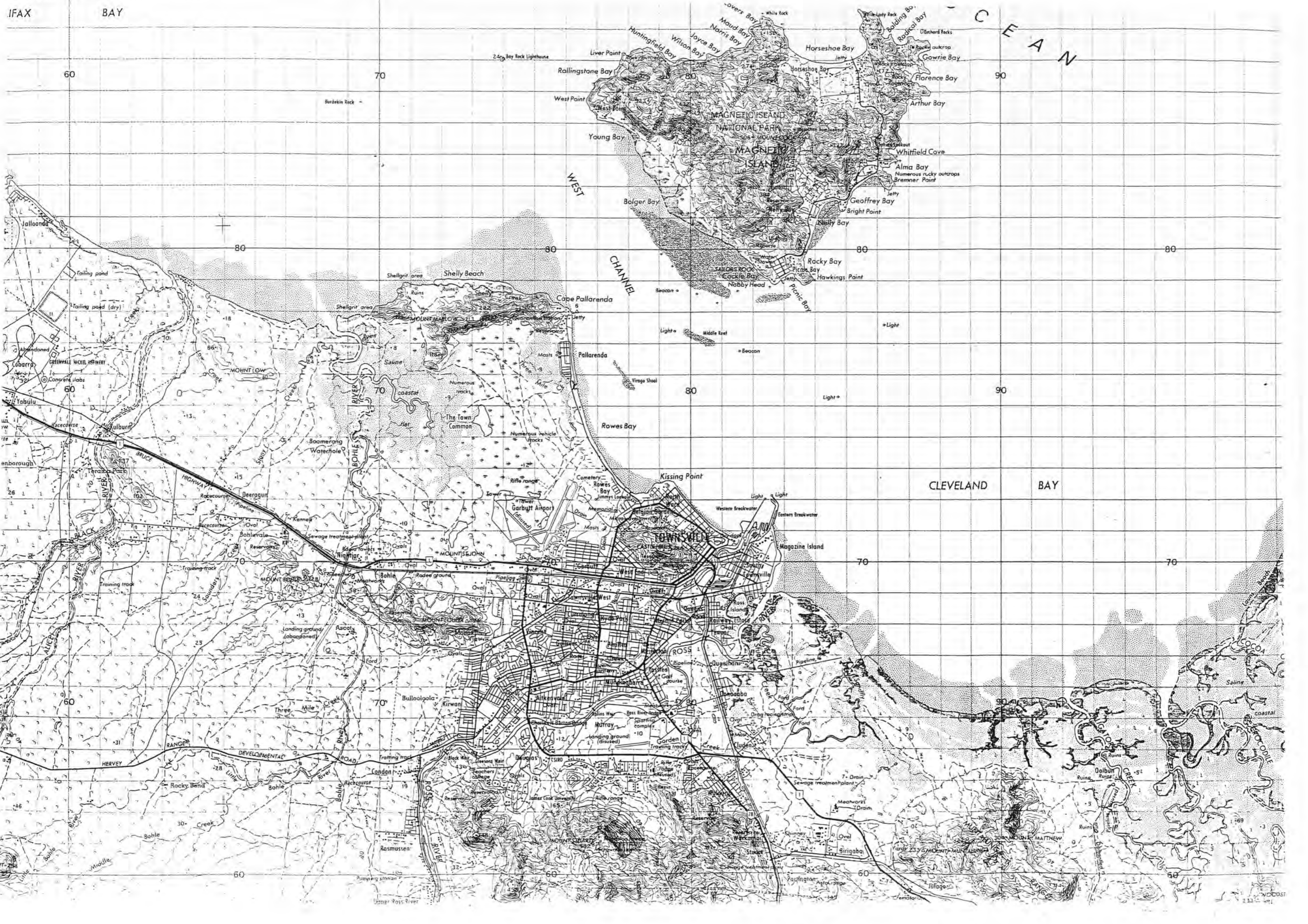
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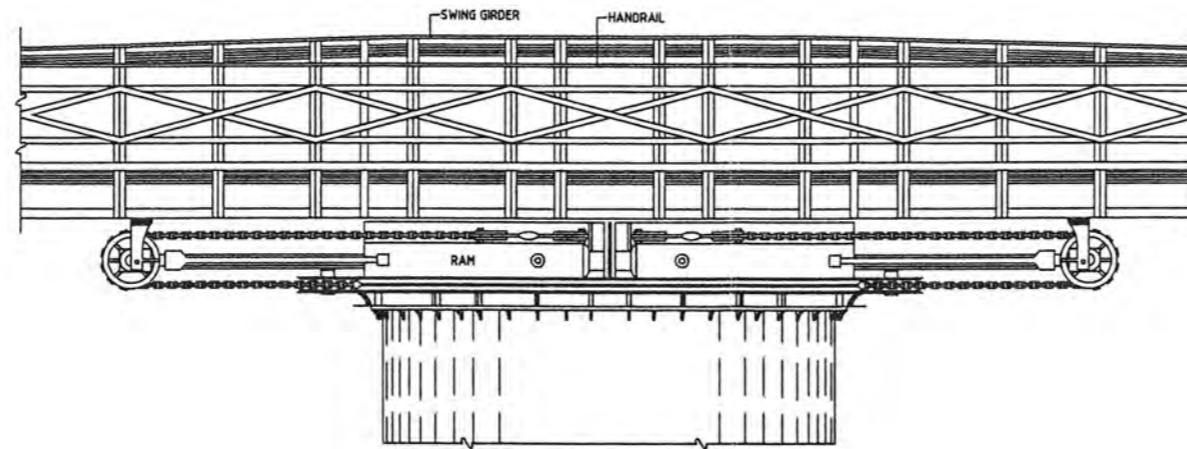


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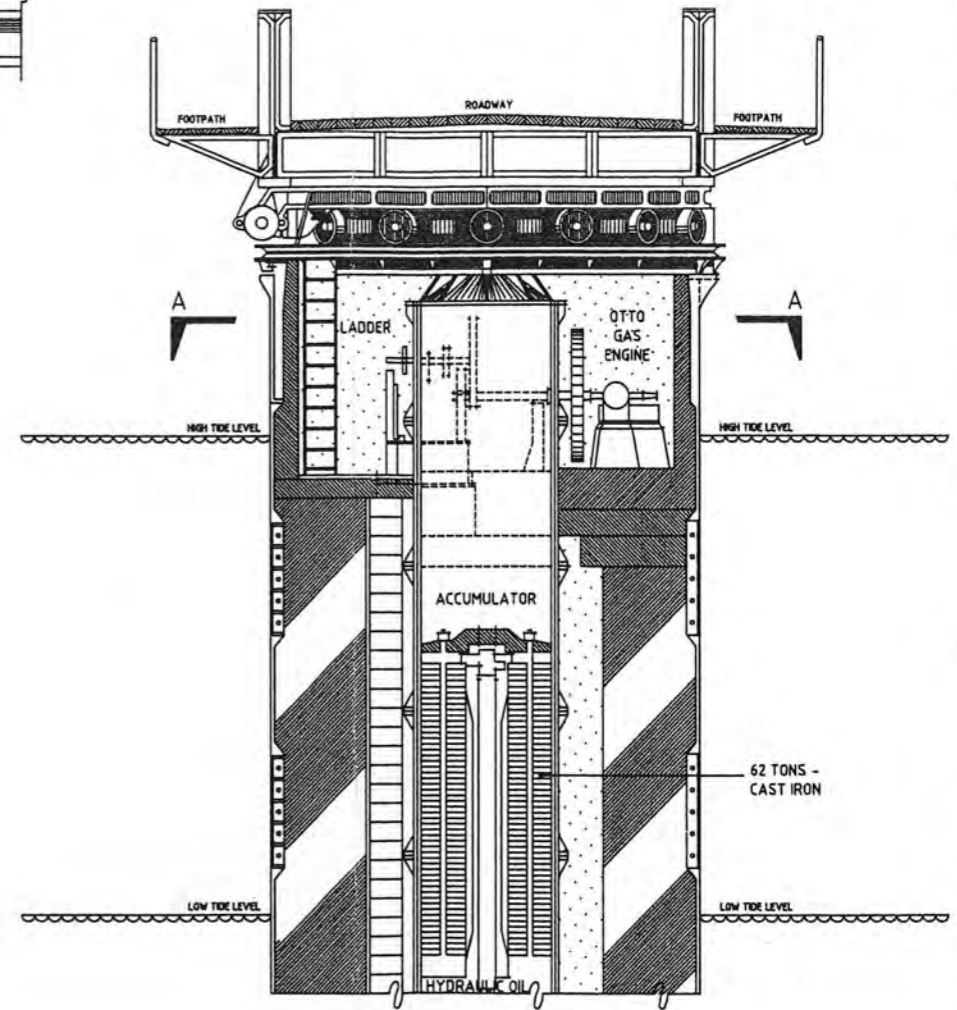
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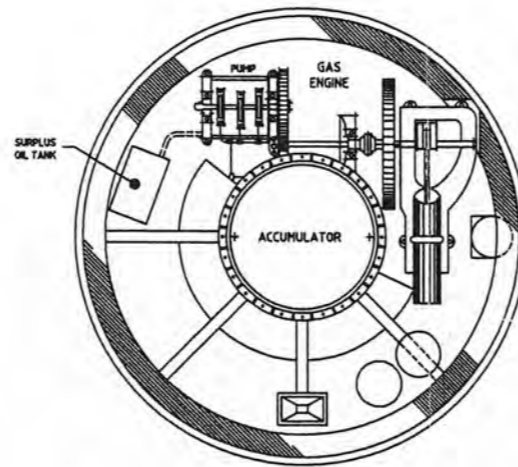
VICTORIA BRIDGE ENGINE



ELEVATION AT CENTRE



SECTIONAL ELEVATION - THROUGH CENTRAL PIER



SECTIONAL PLAN AT AA - THROUGH CENTRAL PIER

VICTORIA BRIDGE IS A STEEL SWING BRIDGE BUILT ACROSS ROSS CREEK IN TOWNSVILLE BETWEEN THE YEARS 1887 AND 1889. THE DECISION TO BUILD A SWING BRIDGE WAS MADE BY THE QUEENSLAND GOVERNMENT IN 1884. PLANS WERE PREPARED IN 1885 BY THE GOVERNMENT ENGINEER FOR BRIDGES, J.H. DANIELLS. THE CONTRACT FOR SUPPLY OF MATERIALS AND ERECTION WAS AWARDED TO G. H. ROYCE & Co. OF SYDNEY WHO IMMEDIATELY SET UP AN OFFICE IN LONDON AND ORDERED THE MATERIALS. THE STEEL PIPES WERE MANUFACTURED BY HEAD WRIGHTSON & Co. OF MIDDLES BOROUGH AND THE HYDRAULIC MACHINERY BY OWENS & Co. OF WHITE-FRIARS, LONDON.

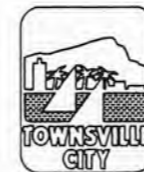
VICTORIA BRIDGE WAS SOMEWHAT UNUSUAL IN DESIGN. UNLIKE MOST SWING BRIDGES WHICH OPERATE FROM A CONTROL TOWER ABOVE THE DECKING, IT OPERATED FROM A POINT BELOW THE DECKING, AT THE TOP OF THE MAIN CYLINDER. MOST BRIDGES OF THIS TYPE WERE OPERATED BY STEAM OR, IN LATER EXAMPLES, ELECTRICITY. THE USE OF GAS TO OPERATE VICTORIA BRIDGE WAS UNUSUAL.

THE GAS ENGINE WAS MANUFACTURED BY CROSSLEY BROS. OF MANCHESTER AND WAS AN OTTO & CROSSLEY PATENT. THE OTTO & CROSSLEY GAS ENGINE IS NOW A RARITY IN THE WORLD. OTTO INVENTED THE GAS ENGINE IN 1876 AND IT WAS HE WHO ALSO DEVELOPED THE DIESEL ENGINE AT A LATER DATE. CROSSLEY'S WERE FAMOUS AS ENGINEERS, AND MANY OF THE ENGINES USED IN EARLY NORTH QUEENSLAND GOLD MINES WERE MADE BY THEM.

THE SWING SECTION OF THE BRIDGE WAS WEDGED SHUT CIRCA 1924.

THIS ENGINE WAS RESTORED BY COMMUNITY EFFORT BETWEEN 1985 AND 1991, WITH FUNDING ASSISTANCE BY THE TOWNSVILLE CITY COUNCIL AND WITH THE ASSISTANCE FROM THE COMMONWEALTH GOVERNMENT UNDER THE CULTURAL HERITAGE PROJECTS PROGRAM.

ZONE	REF.	REVISIONS	BY	CKD.	DATE



ASSOCIATED DRAWINGS		CITIWORKS TOWNSVILLE		VICTORIA BRIDGE ROTATION	
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LEVEL DATUM	SV INDEX NO.	MANAGER - CITIWORKS	DRN.	EJC	
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Report on Victoria Bridge, Townsville and it's Otto Crossley Engine

Introduction

The Victoria Bridge in Townsville, North Queensland, is a nineteenth century swing bridge of very advanced design built in the then frontier town of Townsville in 1886-9. More than a hundred years later it is the second oldest of the four remaining swing bridges in Australia (1). The swing span was powered by a gas fuelled internal combustion engine driving an oil hydraulic system. The engine is an Otto Crossley four-stroke, and is a very early example of such engines. There are 10 Otto Crossley engines known in Australia and the Victoria Bridge engine is the third oldest (2). These engines are so important to the history of the internal combustion engine that a younger (1895) model was sold at auction for £69,300 (\$A175000) in the UK recently (3).

The Victoria Bridge has been recognised for its cultural heritage significance. The bridge is entered in the Queensland Heritage Register, the register of the National Trust of Queensland and in the Register of the National Estate of The Australian Heritage Commission (4).

The Bridge

Townsville was founded in 1864 between Castle Hill and nearby Ross Creek, a tributary of the Ross River. The creek rapidly became the Port of Townsville with development on both banks of the creek and ferries linking the sides. In 1879 a bridge with a wooden deck, concrete piers and a windlass operated drawbridge was constructed. In testing, 17 men could not raise it so it was rapidly demolished. In 1884 John H Daniells, the Queensland Government's Engineer for Bridges commenced the design for the current Victoria Bridge. The design was for a steel bridge, 168m long with a 46m swing span. The swing span had a girder and wooden deck while the 10 approach spans are on steel screw piles with the road supported by shaped metal panels.

Tenders were called in 1885 and the contract for materials and construction was awarded to G.H. Royce & Co of Sydney and London. This Royce is no known relation of the Royce of Rolls-Royce as asserted by O'Connor (1). Royce split the contract between:

- Messrs Head Wrightson and Co, of Middlesborough England - cylinders
- Lecoq, of Halle Belgium – superstructure
- Messrs Owens and Co, London UK – hydraulics
- Crossley, Manchester UK – engine

Construction commenced in December 1886 and the bridge was opened on 2 July 1889 after delays caused by leakage of tidal waters into the central pier and an approach embankment failure. Royce's workforce was supervised by Robertson & Stein while James Laurie was the Queensland Government's resident Engineer. Victoria was chosen as the name for the bridge from a field of Parkes (the mayor), Griffith (the Premier), Stokes (the street leading to the bridge and Ross Creek (the stream). Queen Victoria celebrated her golden jubilee in 1887.

The bridge was found to have been located too near one bank of the creek and the opening of the swing section only ever allowed shipping traffic to pass on one side. The bridge ceased to operate as an opening bridge in 1925 and vehicular traffic ceased in 1975 with the completion of the George Roberts Bridge between Denham Street and Dean Street.

After closure the council proposed that the bridge be demolished. Public opinion swayed the Council to investigate keeping the bridge. An investigation found that only a small number of swing bridges survived in Australia and England. After some years of inactivity Council leased the bridge to a commercial company which closed the bridge in creating a retail facility on the deck of the bridge and office space in the lower sections of the bridge structure. The retail facility was removed and the bridge was refurbished to its present state in 2001.

The Engine

The power for the swinging mechanism was provided by a 6hp (4.5kw) Otto Crossley four-stroke internal combustion engine, serial number 10500. Nicolaus Otto, a German engineer, had invented this type of engine in 1876 and by 1888 over 45,000 engines had been produced world wide of which over 10,000 had been manufactured under licence by Crossley. Though the 1887 Townsville Crossley engine works on the same principle as a modern 4 stroke car engine, it has two peculiar features:

1. A cross head guide to connect the piston to the connecting rod as used in a steam engine.
2. A side shaft cam operated slide valve to time the gas/air admission and flame ignition. This form of slide valve was abandoned in 1888.

The exhaust valve was a poppet valve activated by a rocker lever. The engine weighs about 2 tonnes and has a compression ratio of 2.5:1.

The gas supply to the bridge was the lowest point in the Townsville system and condensation caused problems. The engine being inside the central pylon, accessible by a trapdoor in the roadway, and basking in a tropical sun, did not promote engine use or maintenance. As a result the bridge was often operated manually.

It is certain that the engine has not operated since 1925 when an Act of Parliament allowed permanent closure of the river to tall masted sailing vessels.

In about 1980 the engine was removed in pieces from the pylon. It was stored outside in a sewage works near salt water for almost ten years. The engine was offered to the local Historical Machinery Club and three members Messers Aitken, Jones and Cook restored it. It was placed in a display enclosure adjacent to the bridge. More recently the engine was again removed and there was a proposal to mount it, uncovered, unfenced and unprotected on top of the swing span. The engine is presently mounted in a caged enclosure under the west end of the bridge.

The Opening Mechanism

The original installation had the gas engine driving a three cylinder oil pump. There is a wooden toothed 4:1 reduction gear and a clutch between the engine and the oil pump. The pump forced oil into an accumulator. The accumulator was a 200mm (8 inch) cast iron tube at the top of which was a 63 tonne (62 ton) cast iron mass. The oil pressure raised the mass through 3.81m (12'6"). At the top of its travel, oil pressure to the accumulator was diverted by a by-pass valve. The accumulator stored enough energy for at least one opening and closing of the bridge.

The operator could monitor operations from inside the pylon by looking out between the rollers. He opened valves to hydraulically withdraw the wedges at each end of the swing span. He then used a valve to operate a hydraulic ram which pulled on a 32mm (1 ¼") Admiralty tested chain which ran round a spoked turn-table running on 16 cast iron conical rollers running on a roller path bolted to the 4.9m (16") central pylon. A ram movement of 2.4m (8') opened the bridge. A second ram and chain closed the bridge.

In 1896 the swing span opened 1100 times and passed 1555 vessels. Unfortunately there is also a history of poor maintenance, machinery breakdown, gas supply difficulties and the bridge jamming in hot weather. It seems that it was possible for the operator to open the bridge by hand but there is no description of how this was done. Complex machinery and unskilled operators do not seem to have been a happy combination. In 1896 an engineer was sent from Brisbane at Townsville's Council expense because "the minister considers there may not be sufficient engineering talent in Townsville to deal with the matter" (5).

References:

- (1) O'CONNOR, C (1985) *Spanning two centuries: historic bridges of Australia*, Brisbane, University of Queensland Press
 - (2) MURRAY, P (1990) Crossley Register, *The Old Machinery Magazine* no 32
 - (3) WRIGHT, G 2002 World Record! *Stationary Engine Magazine*, Jan p3
 - (4) ALLOM LOVELL ARCHITECTS BRISBANE (2000) *Conservation Plan for Conversion and Adaption of the Bridge Structure*, Townsville City Council.
 - (5) TOWNSVILLE CITY COUNCIL (1980) *Submission to the National Estate for funding to restore the Victoria Bridge in Townsville*, Townsville City Council.
- GIBSON-WILDE, B and D (1980) Townsville's Historic Swing Bridge, *Journal of the National Trust of Queensland*, October p35-39.

Photocopies of the relevant sections of these documents are attached in the Appendices section of this nomination.

APPENDIX A
Nomination Form
Australian Historic Engineering Plaquing

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

Name of work: Victoria Bridge and its Otto Crossley Gas Engine

The above-mentioned work is nominated to be awarded a Historic Engineering Marker.

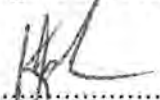
Location, including address and map grid reference if a fixed work:
Stokes Street, Townsville (Lat 19° 15.705' S long 146° 49.05E)
Bridge across Ross Creek – tributary of the Ross River

Owner: Townsville City Council

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

Access to site: The bridge is used for pedestrians

Nominating Body: Townsville Local Group, Engineers Australia


.....
Chair of Nominating Body
Date: ..19/5/03.....
.....

Chair of Division Engineering Heritage
Group
Date:



TOWNSVILLE CITY COUNCIL
ADMINISTRATION BUILDING, WALKER STREET
TOWNSVILLE
ABN: 81 143 904 097

All communications to be
addressed to:
The Chief Executive
Officer
PO Box 1268
Townsville Qld 4810.
Telephone: 4727 9454
Fax No.: 4727 9052
AUSDOC DX 41447
Townsville

DEPARTMENTAL FACSIMILE NUMBER (07) 4727 9052

In reply please quote ref.: S081001
JOP:JOP

CITY
HERITAGE AND
BEAUTIFICATION
UNIT

27th March 2003

Institution of Engineers – Australia
Townsville Local Group
PO Box 1056
Townsville 4810
Queensland

Attention: Chris Martin

**RE: THE INSTITUTION OF ENGINEERS – AUSTRALIA. HISTORIC ENGINEERING
MARKER TO VICTORIA BRIDGE**

Dear Chris,

Thank you for your letter dated 10th February 2002. The Townsville City Council has approved your request to nominate the Victoria Bridge and Gas Engine for a Historic Engineering Marker.

It is a condition of this approval that if the nomination is approved, the resulting installation of the Historic Engineering Marker must be coordinated and supervised by Council's City Heritage and Beautification Unit.

I look forward to hearing from you. Should you have any enquiries regarding matters raised in this letter, please contact the undersigned on telephone number 4727 9457 or e-mail jop@townsville.qld.gov.au for assistance.

Yours Sincerely



JO PREGO
URBAN DESIGNER/HERITAGE OFFICER

APPENDIX B
Engineering Heritage Australia
Plaquing Nomination Assessment Form

1. BASIC DATA

Item Name: Victoria Bridge and Otto – Crossley Engine

Other/Former Names: Ross Creek Bridge

Location (grid reference if possible): 19° 15.705's 146° 49.037 E; 7870200MN
480800ME Region S5

Address:

Suburb/Nearest Town: Townsville CBD

State: Queensland

Local Govt. Area: Townsville City Council

Owner: Townsville City Council

Current Use: Pedestrian Bridge

Former Use (if any): Vehicular Traffic Bridge with swing section powered by
an Otto Crossley four stroke engine and hydraulic rams.

Designer: John H Daniells, QLD Gov, Engineer for Bridges. Later consulting
Engineer, Townsville

Maker/Builder: George Herbert Royce, Engineer, Sydney & London. Local
Supervisors Robertson & John A Stein.

Year Started: 1886 **Year Completed:** 1889

Physical Description: 168m long bridge including 46m swing span with a 4
stroke engine, clutch, reduction gear, oil pump,
mass accumulator and rams.

Physical Condition: Bridge is in fair condition. The engine is separately displayed.
The accumulator, 62 tonne weight, rollers etc still installed.

Modifications and Dates: The bridge ceased operating as a swing bridge in
1925 and was closed to vehicular traffic in 1975. The bridge was built in with a
shopping facility soon after which was removed in 2000 when the bridge was
completely refurbished.

Historical Notes: See report attached

Heritage Listings (information for all listings)

Name: Queensland Heritage Register

Title: Victoria Bridge

Number: 600928

Date:

Name: National Trust of Queensland
Title: Victoria Bridge
Number: Listed
Date:

Name: Register of the National Estate
Title: Victoria Bridge
Number: 008973
Date: 21/03/1978

2. ASSESSMENT OF SIGNIFICANCE

Historic Phase: Until the construction of an artificial harbour in the 1870's the only port for Townsville was Ross Creek. A swing bridge was required to facilitate port, warehouse and domestic development.

Historic Individuals or Association: though the engineers involved Daniells & Royce were not well known, the bridge shows competence and inventiveness in a frontier area.

Creative or Technical Achievement: The bridge is highly significant for its advanced design & incorporation of new technologies in a period of rapid technical advance.

Research Potential: The early use of advanced technologies makes this bridge worthy of much further physical & documentary research.

Social: The bridge is highly valued by the citizens of Townsville and is a local landmark.

Rarity: Unique in Australia and maybe the world because of the use of a gas powered four stroke engine driving an 'oil hydraulic' system.

Representativeness: There are only 4 swing bridges and 10 Otto Crossley engines remaining in Australia.

Integrity/Intactness: The bridge, though is basically intact.
The engine has been removed, restored & separately displayed. The remainder of the mechanism is in place.

Statement of Significance: The Victoria Bridge, Townsville, is of national significance because it is a rare type of bridge powered by a very early example of a four stroke engine erected and operated in a frontier town and providing a historically significant service to the community.

Assessed Significance
item)

National

State

Local

(circle the relevant

Image/s with caption:

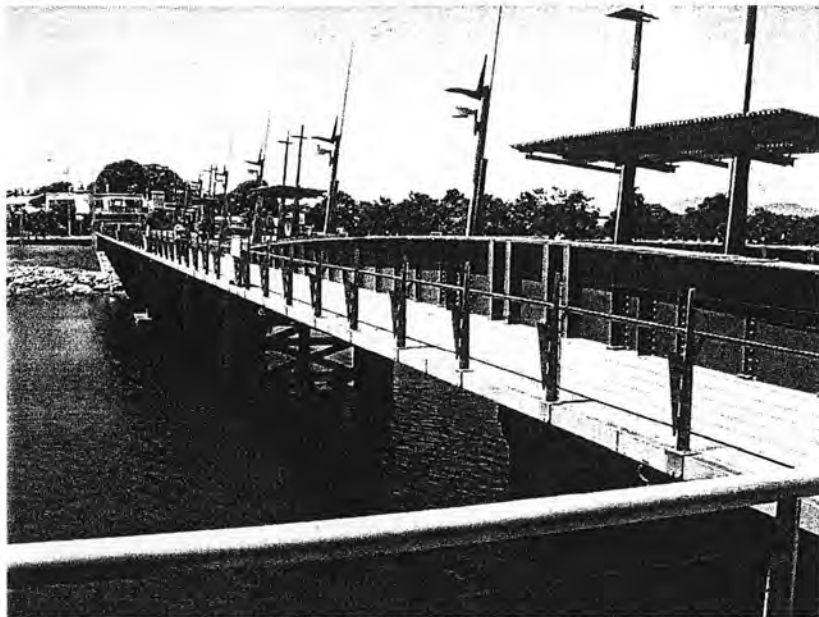


Photo 1 The northern side of the bridge – note the parabolic girders.



Photo 2 The refurbished deck looking west towards Castle Hill.

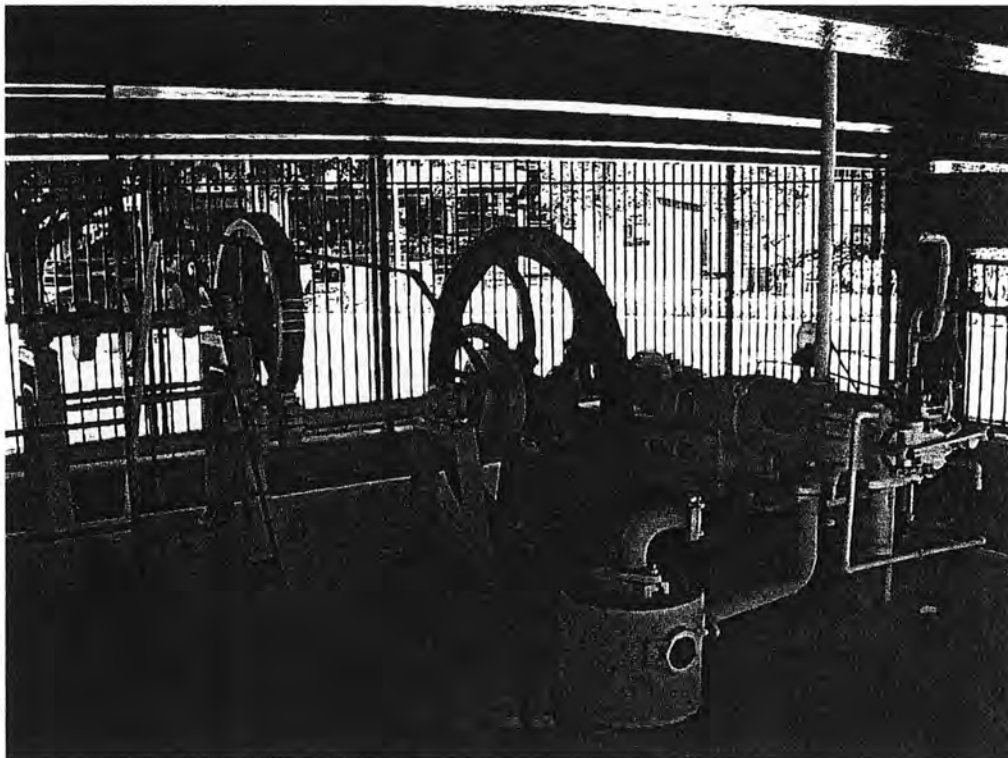
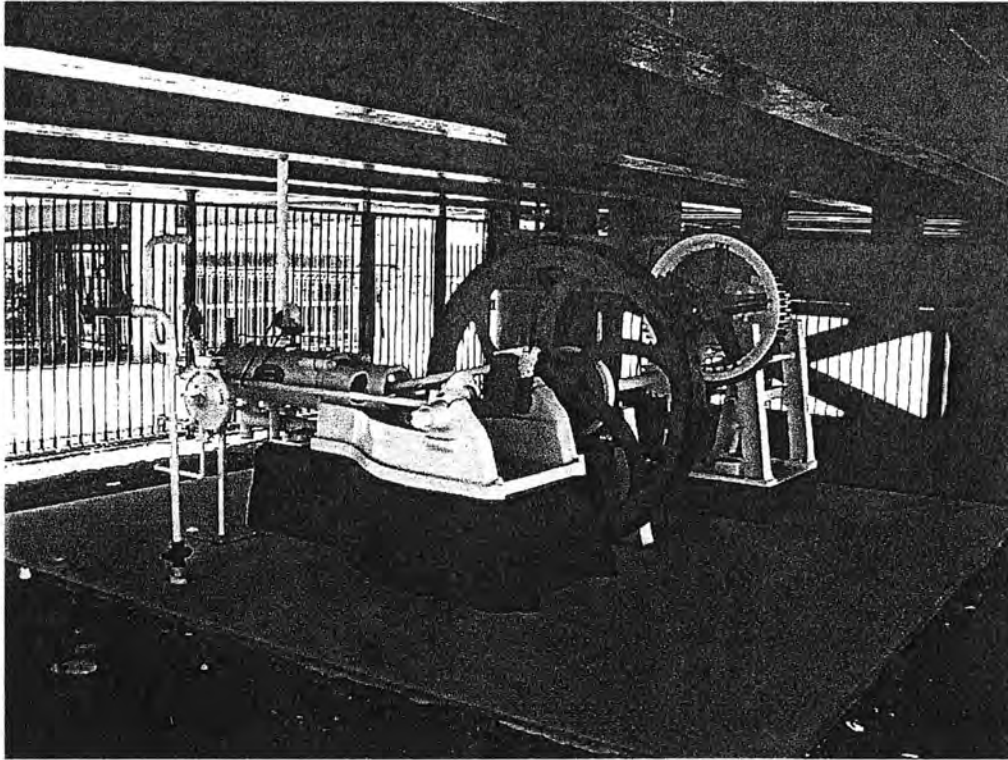


Photo 3 and 4 – Two views of the Otto-Crossley Gas Engine in the display enclosure under the western end of the bridge.

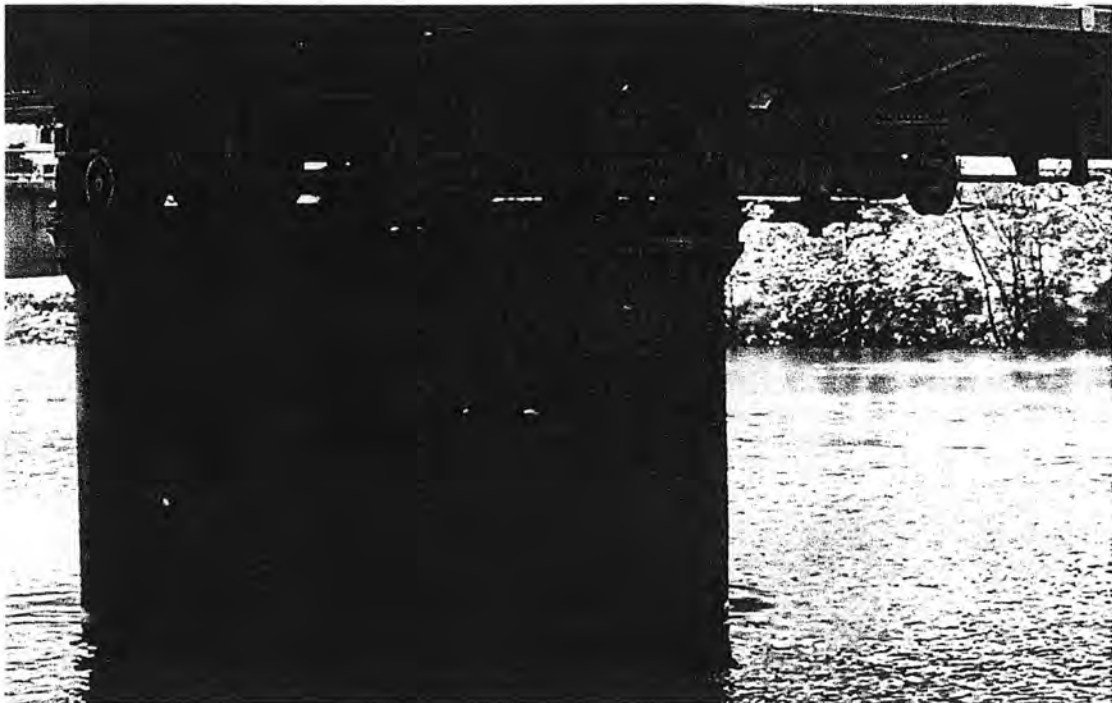
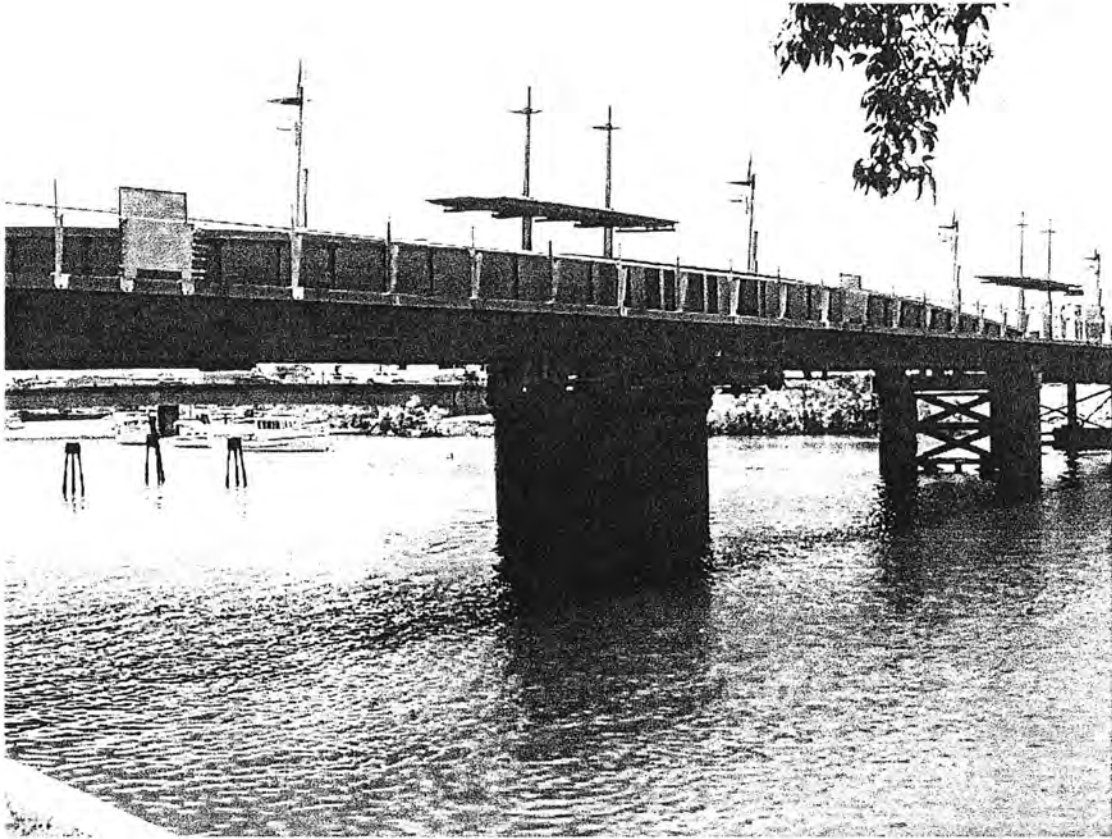


Photo 5 and 6 North aspect of the bridge with detail of the main support for the swing bridge. Note the hydraulic rams are still intact.

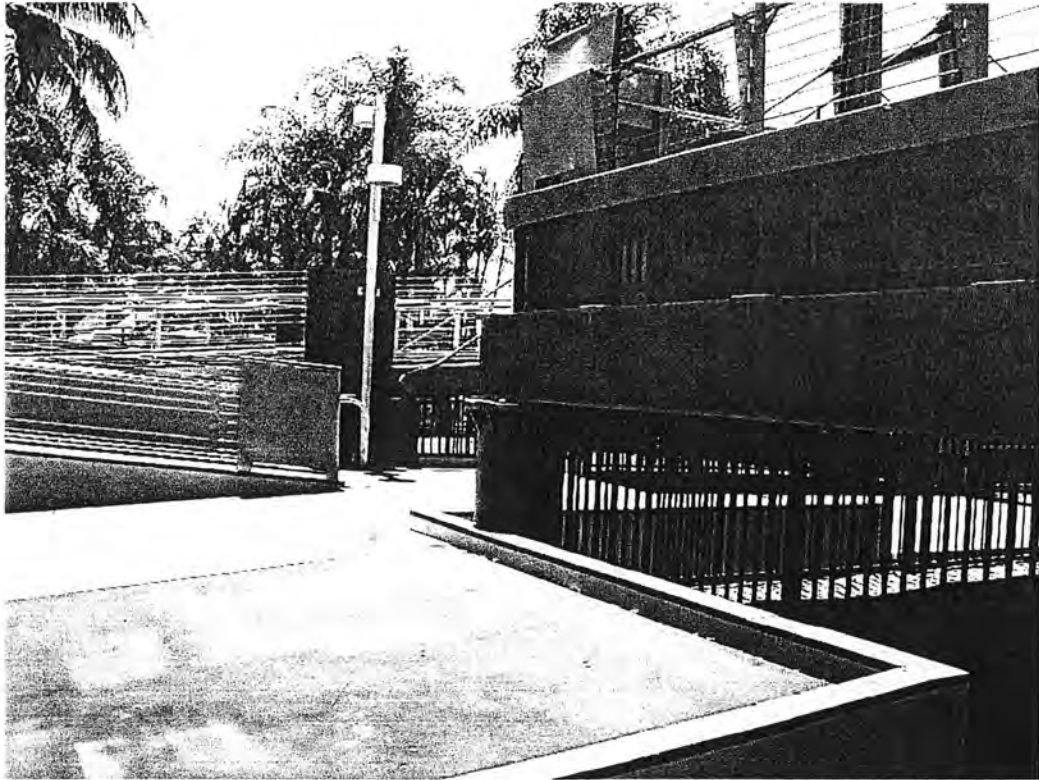


Photo 7 West Bank bridge approach – the plaque could be mounted on the handrail sheeting in front and to the left of the lamp post facing the display enclosure or see photo 8.

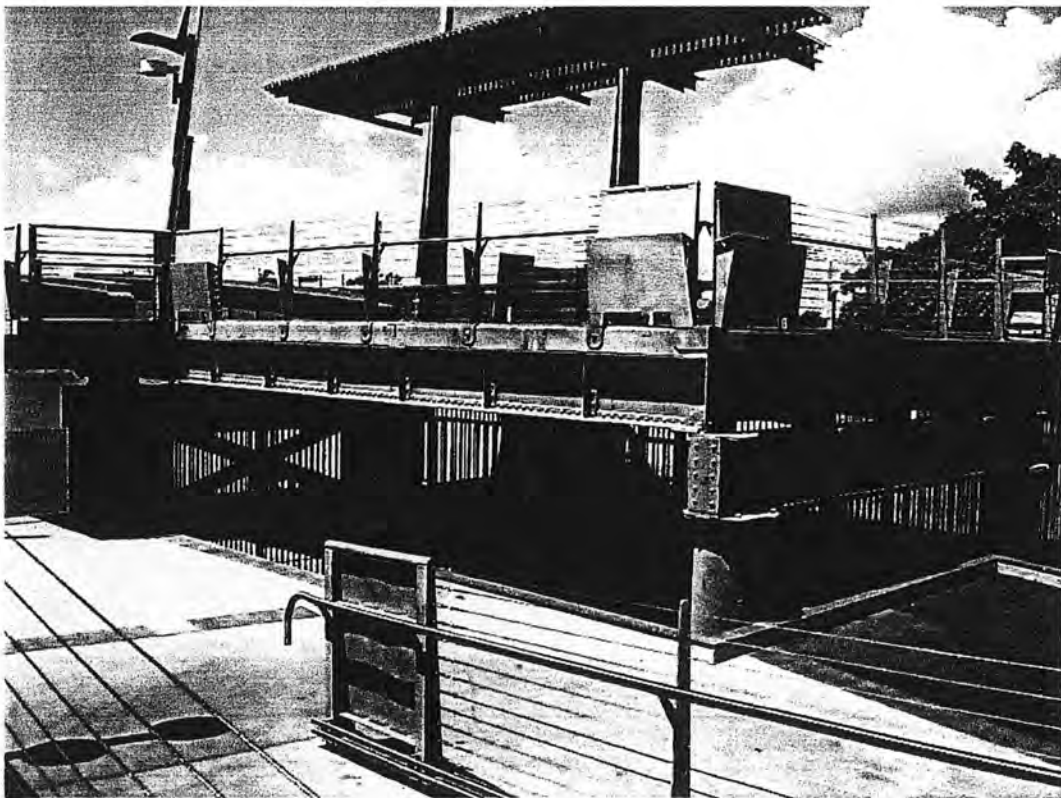


Photo 8 West bank bridge approach – the plaque could be mounted inside the display enclosure facing in the direction of the photographer. Photo 4 was taken from this side of the enclosure.



Plaque mounted on western approaches to the bridge

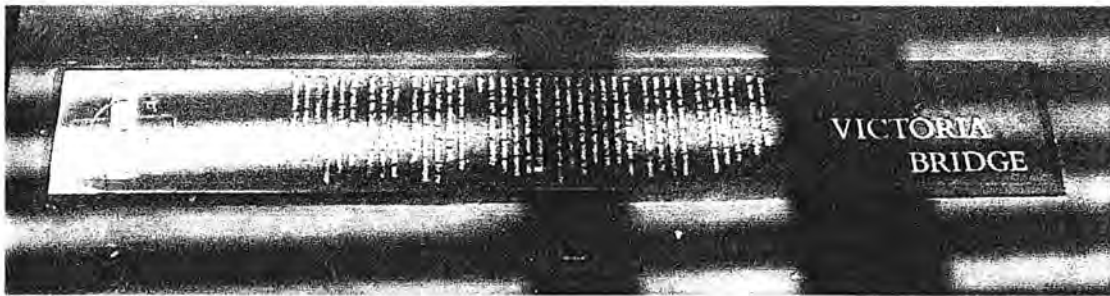
Wording on the plaque is:-

"The Victoria Bridge, the first major bridge built in Townsville, was constructed between 1884 and 1889 linking the city to South Townsville. It was designed by Government Engineer for Bridges, JH Daniells and its construction was funded by the Queensland Government. Built at a cost of more than £20,000 the bridge was completed and handed over to the Townsville Municipal Council in July 1889.

As shipping was critical to the early economy of the town, a "swing" bridge was designed to allow access to the wharves upstream in the Ross Creek channel. The central section of the swing bridge rotated about a vertical axis on a cylindrical pier, allowing space on either side for the passage of ships to those areas. The gas engine powering the swinging mechanism was housed within the central pier.

Threatened with demolition the bridge was heavily modified in the 1980-'s with the construction of an enclosed shopping centre over the carriageway and the removal of the approaches on both sides. In 2001 the Townsville City Council, with support from the State Government, restored the bridge by removing the enclosures and returning it to the pedestrians of the city.

In 1923 the swing mechanism of the bridge was closed permanently. The bridge remained open to vehicular traffic but as other bridges were constructed in Townsville it was no longer needed and was closed in 1975."



Plaque mounted above swing sections support pier

Wording on the plaque is:-

“Opened on 2nd July, 1889 by Mayor Alderman J.N. Parkes.

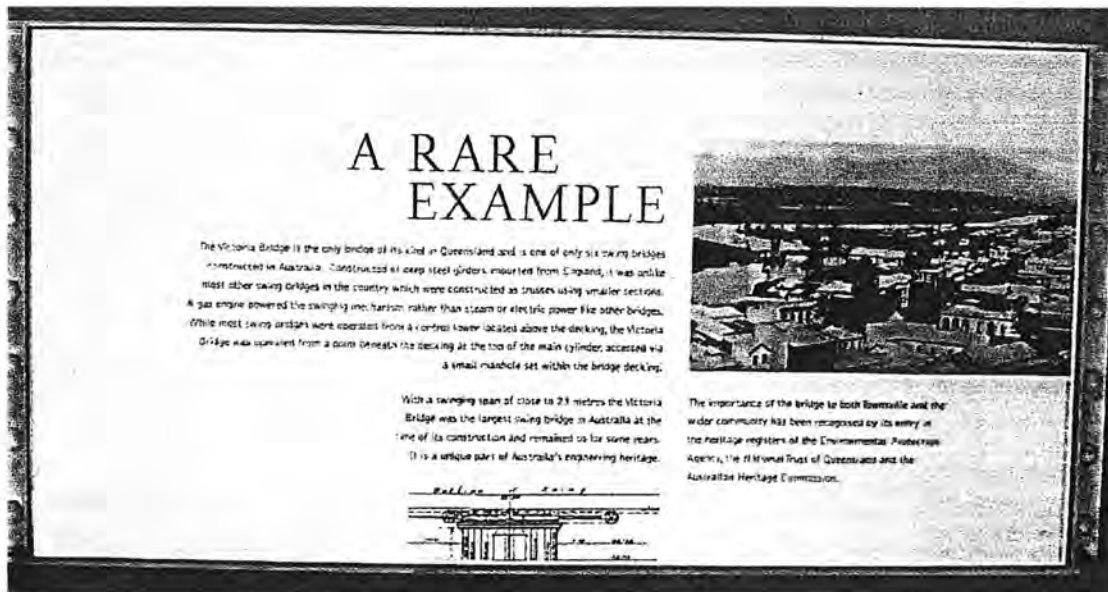
The gas engine that powered the swinging mechanism of the bridge is one of the few remaining examples of its type in the world.

Invented by German engineer, Nicholaus Otto, the engine was manufactured in 1886 as an Otto-Crossley patent by Crossley Bros in Manchester, England.

It was housed in a small engine room below the bridge deck, within the cylindrical pylon that supports the bridge. It produced 6 horsepower. The swing portion of the bridge is in turn supported on cast steel rollers attached to the top of the central pylon. The engine drove a 3 cylinder pump that supplied hydraulic power to two external horizontal rams that opened and closed the swinging bridge span using 1 3/4 inch diameter admiralty chains.

The engine was removed when the bridge was redeveloped in 1980. The engine is now displayed under the Ogden Street entrance.

This project was carried out with assistance from the Commonwealth Government under the Cultural Heritage Projects Program and the State Government under the Regional Communities Program.”



Plaque mounted on eastern approach

Wording on this plaque is:-

“The Victoria Bridge is the only bridge of its kind in Queensland and is one of only six swing bridges constructed in Australia. Constructed of deep steel girders imported from England, it was unlike most other swing bridges in the country which were constructed as trusses using smaller sections. A gas engine powered the swinging mechanism, rather than steam or electric power like other bridges. While most swing bridges were operated from a control tower located above the decking, the Victoria Bridge was operated from a point beneath the decking at the top of the main cylinder, accessed via a small manhole set within the bridge decking.

With a swinging span of close to 23 metres the Victoria Bridge was the largest swing bridge in Australia at the time of its construction and remained so for some years. It is a unique part of Australia’s engineering heritage.

The importance of the bridge to both Townsville and the wider community has been recognised by its entry in the heritage registers of the Environmental Protection Agency, the National Trust of Queensland and the Australian Heritage Commission.

Plaque to be mounted on the western approach in the Otto – Crossley display enclosure by Townsville City Council.

Wording on the plaque will be:-

“Victoria Bridge is a steel swing bridge built across Ross Creek in Townsville between the years 1887 and 1889. The decision to build a swing bridge was made by the Queensland Government in 1884. Plans were prepared in 1885 by the Government engineer for bridges, J.H. Daniells. The contract for supply of materials and erection was awarded to G.H. Royce & Co. of Sydney who immediately set up an office in London and ordered the materials. The steel pipes were manufactured by

Head Wrightson & Co. of Middlesborough and the hydraulic machinery by Owens & Co. of White-Friars, London.

Victoria Bridge was somewhat unusual in design. Unlike most swing bridges which operate from a control tower above the decking, it operated from a point below the decking, at the top of the main cylinder. Most bridges of this type were operated by steam or, in later examples, electricity. The use of gas to operate Victoria Bridge was unusual.

The gas engine was manufactured by Crossley Bros. of Manchester and was an Otto & Crossley patent. The Otto & Crossley gas engine is now a rarity in the world. Otto invented the gas engine in 1876 and it was he who also developed the diesel engine at a later date. Crossley's were famous as engineers, and many of the engines used in early north Queensland gold mines were made by them.

The swing section of the bridge was wedged shut circa 1924.

This engine was restored by community effort between 1985 and 1991, with funding assistance by the Townsville City Council and with the assistance from the Commonwealth Government under the Cultural Heritage Projects Program."



ENGINEERS
AUSTRALIA

PROPOSED CITATION

HISTORIC ENGINEERING MARKER
VICTORIA BRIDGE AND ITS OTTO-CROSSLEY ENGINE

This bridge was designed by John H Daniells, Queensland Government Engineer for Bridge, constructed by George H Royce, Engineer of Sydney and London, and opened on 2nd July 1889. The bridge is 168m long and has a 46m swing span which was powered by a gas-fuelled Otto Crossley four stroke engine driving hydraulic pumps and rams.

Four stroke engines now power cars and trucks and this 4.5kw engine is the third oldest remaining in Australia. The bridge is one of only four swing bridges in Australia. The bridge and engine combination are unique.

Engineers Australia
Townsville City Council, 2003

Appendices

Appendices are labelled on the top right corner of each page and consist of copies of relevant sections of the references listed below:-

- (1) O'CONNOR,C (1985) *Spanning two centuries: historic bridges of Australia*, Brisbane, University of Queensland Press
- (2) MURRAY, P (1990) Crossley Register, *The Old Machinery Magazine no 32*
- (3) WRIGHT, G 2002 **World Record!** *Stationary Engine Magazine, Jan p3*
- (4) ALLOM LOVELL ARCHITECTS BRISBANE (2000) *Conservation Plan for Conversion and Adaption of the Bridge Structure, Townsville City Council.*
- (5) TOWNSVILLE CITY COUNCIL (1980) *Submission to the National Estate for funding to restore the Victoria Bridge in Townsville*, Townsville City Council.
- (6) GIBSON-WILDE, B and D (1980) **Townsville's Historic Swing Bridge**, *Journal of the National Trust of Queensland*, October p35-39.

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Box 42, St Lucia, Queensland, Australia

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College Road bridge in Brisbane was built in 1913 and is skew, with a span of 17.6 m normal to the opening and a 24.1-m wide roadway. Walton's Bridge at The Gap, Brisbane has two arch spans. The bridge over Crystal Brook at Mount Spec appears to be a stone arch but is actually a concrete arch faced with stone. It has a single span of 18.3 m. The William Jolly Bridge in Brisbane is difficult to classify for it has steel arch ribs and a steel deck encased in concrete. The three main spans are 72.5 m, centre to centre of the piers. There is also a substantial, 28.0-m span concrete arch included in the south approach. It was completed in 1932.

Movable bridges are also rare in Queensland. However the Victoria or Ross Creek swing bridge in Townsville (fig. 134) is important. It was built about 1889 and has two main spans of 22.9 m, coincidentally the same as the 1883 swing bridge at Sale. These two bridges were the largest Australian movable bridges for some years, until the completion in 1901 of the 29.1-m spans of the

Fig. 133 *Lamington Bridge, Maryborough, 1896, is one of the world's first concrete girder bridges.*



Fig. 134 Victoria swing bridge, over Ross Creek, Townsville, c.1889.

Rozelle Bay bridge in Sydney. The bridges at Sale and Townsville are, however, different in design; that at Sale uses trusses for the swing section whereas there are girders at Townsville. Furthermore, whereas the Sale bridge was operated by hand, that at Townsville has a steam-powered operating system constructed by H.C. Royce who became famous as one of the partners of Rolls Royce.

The Jubilee Bridge across the Nerang River at Southport (c.1923) had an unusual, 7.6-m bascule frame and a 13.2-m timber bascule span. It was more notable for its great length, having twenty-two 7.6-m timber girder approaches on one side and thirty-four on the other. The Granville Bridge across the Mary



Railway B

The only k built in 189 span of the presumably to Grandch The oldest west of Bu girder, but 11.0-m spa

A193

RON J. AITZ
COLLECTOR

AUSTRALIA'S OLDEST ENGINE as of November, 1991.

Following on from my article in TOMM no 22 when I set the Bait to find the oldest engine held by a restorer in Australia.

Only 2 people answered after me telling of having "Otto" Crossley number 10500 made in 1886, in Townsville.

The first person to answer and with the oldest known engine in Australia was Jeff (Step toe) Wolfgang, of Denham, NSW.

Jeff tells of the history and recovery of his "Otto" Crossley number 8828. (Patrick Knight of England confirms that this engine left the Openshaw Work, Manchester in late 1883. Patrick has also helped with a copy of the 1888 "Otto" Crossley installation and running book).

Jeff's engine used to drive a newspaper printing press in Singleton, NSW. The paper started in about 1859 and a gas works came to the town in 1870. The engine had been dismantled in 1920 and stored in pieces in a shed. Since 1920 the proof readings of the newspaper were stored on top of the engine. During the storage period at least 3 floods had covered the mess!

As the demolisher was wrecking the building Jeff dived in when he saw a piece of metal sticking out of the heaps of paper. Everything but the governor was recovered, with the added bonus of a spare slide valve and a valve connecting rod that has been made into a spanner.

Jeff found an old man who used to drive the Crossley (He has since passed on) who told Jeff of running the engine during its last years. Apparently the engine so lacked suction that he had to press the gas bladder during the induction stroke to keep it running, this he did for a couple of years while they printed the paper. The man also said it was very quiet running with the exhaust going away down the river bank.

Jeff describes the recovery as a miracle as most scrap ends up in the B. H. P. Smelter only 60 miles away.

"Step toe" suits him as he has an obsession for collecting anything old and has a huge collection of old equipment, including over 200 engines.

This Crossley is at present stored unassembled in such a way that we can not at present obtain a photo.

Our second eldest engine is like-wise a "Otto" Crossley number 7801, made in 1884. This Crossley is owned by Henri Jut of Appin.

This Crossley was found buried in a silage pit on an abandoned farm 2 miles out of Appin and is the engine shown in our photo (If that photo is good enough, Ian, Or else we use the original as seen in the Science Museum, London, or even both!)

The engine is in bad state of repair with bits missing from the front of the slide valve. There has been an attempt to convert the engine to spark ignition and a carby has been bolted to the front of the slide valve. The slide valve activating rod has been removed (And lost) and the gas pilot ignition hole plugged with wood and clay.

Interestingly by reading the "Otto" Gas Engine Instruction book I find that they were made in sizes from 1/2 hp to 12 hp and up to 40 hp in twin form.

Horse power can be deducted from the size of the gas admission pipe; 1/2" for 1/2 & 1 hp, 3/4" for 2 to 4 hp, 1" for 7 to 10 hp, etc.

The exhaust further hints of horse power; 1 hp=1" Exhaust Pipe, 2 hp=1.1/4" pipe, 4 hp=1.1/2" pipe, up to 25 hp with a 3" pipe.

Another interesting thing is the recommendation for the right size Gas Meter. The calibration size of meters were worked out to the ammount of lights they would burn, thus, a 3 light meter for a 1 hp engine, up to a 100 light meter for a 25 hp model.

This has proved to be an excellant exercise and now leads the way for a dedicated person to take up the challange an start an Australian Crossley Register, I dare you..... Pat O'Brien, November, 1990.

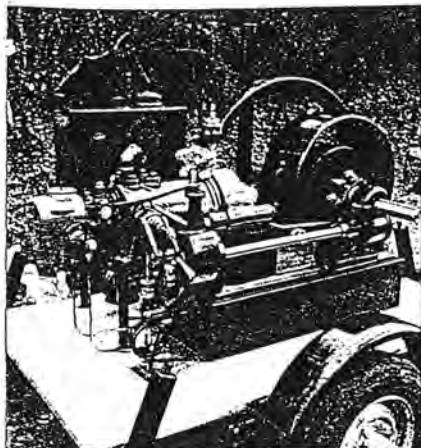
Before submitting this story Peter Murray has started a Crossley Register, (TOMM no 32 Dec, 90) and to date 17/1/91 has 12 Crossleys on his list. Peter is the owner of a very unusual vertical Crossley of 2 Man Power number 11889 and is the smallest vertical engine made(2 man power is almost 3/4hp) and was made in 1888. The size of this engine is 38 inches high by 27 inches wide. This engine must be one of the first mechanical valve model Crossleys made and replaced the ailing slide valve that was subject to leakage, and carbon sticking.

The photo is submitted for approval for printing, but please take care as Peter has lost the negative and this is his last print, please return to me!

Peter Murray may be contacted at 3 Tweed Place, Kaleen, ACT, 2617 or Phone 06-2411864....

30th, March, Carmen's birthday. This article has been put together for a while, hope you can use it.

Ian,. The Otto-Crossley from under the Victoria Bridge has been assembled by a group of men let by Ron Aitken and they are pushing for a display site on the South side. I should have been helping them, but for the big wet. The council were hoping to dump it, very difficult getting any aid from them now!



FRONT COVER: A splendid 1911 Hornsby hot-bulb 5hp engine, s/n 724537, seen at the Amberley Chalkpits Stationary Engine Day. (photo: Philip Thornton-Everson)

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STATIONARY ENGINE STAFF

Editor: Gordon Wright
gordon.wright@kelsey.co.uk
Editorial Consultant: David Edgington
Regular Contributors: Patrick Knight, Eric G Brain, Philip Thornton-Everson, Nigel McBurney, Bob Weight
Design: Sue Costar
sue.costar@kelsey.co.uk

ADVERTISING

Display Advert Bookings (boxed):
Phil Green, 12 Parkland Close,
Old Rossington, Doncaster DN11 0BH
Tel: 01302 864816 Fax: 01302 864086
E-mail: se.adsales@kelsey.co.uk

Advertising Production: Peter Hale/
James Draper. E-mail: se.adprod@kelsey.co.uk
Classifieds: Sue Costar Tel: 01959 541 444.
E-mail: se.class@kelsey.co.uk

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World Record!

ROY J. AITKEN
COLLECTION

There can be very few engines enthusiasts who by now have not heard about the prodigious world record price made at auction by a stationary engine. The engine in question being a Crossley 'Otto' single cylinder inverted vertical gas engine.

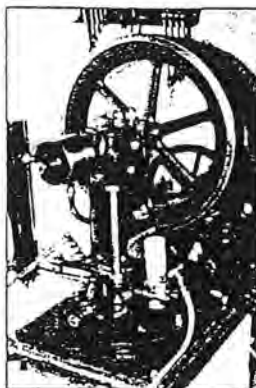
As Editor of our *Tractor & Machinery* magazine, Peter Love, reports: "Hushed gasps and a round of applause were received when the Cheffins auctioneer Paul Gooderham knocked the hammer down on a price of £62,000 (£69,285 including buyer's premium). The record was set at the auction held at Sutton, Cambridge on Saturday October 27. The price exceeded by six times the pre-sale estimate set by our own Patrick Knight."

Paul Gooderman commented afterwards, "We knew it was rare, but nothing prepared us for this kind of result"

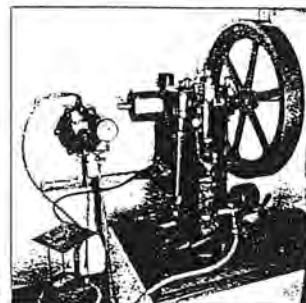
The Otto formed part of a small collection put together by the late Mike Davis from Hampshire. It was manufactured by Crossley Brothers in the early 1890s, is one of only a handful known to survive (s/n 21895) and is in restored condition.

Bidding soon settled down to two determined potential buyers, the successful new owner is John Palmer who said afterwards that he wanted to ensure that the engine stayed in

The C1894 Crossley 'Otto' class 1, which cost its new owner close to £70,000 (including buyer's premium). (photo: Nigel McBurney)



The Crossley with its complete set-up. Press photo released by auctioneers.



Britain, its country of origin (the other bidder was believed to be acting on behalf of an American collector). John was not altogether as surprised as the rest of us that the price went as high as it did, which must be an indication of how highly he values it. So well done John for keeping a vital part of British engine heritage in Britain.

Press reaction

It was interesting to see that news of the price fetched by the Crossley appeared in so many other magazines and newspapers. *Classic Car Weekly* for instance had quite a big piece on it. It was amusing to see the way it was handled by *Motoring Telegraph*, November 10; their reporter was obviously not too sure what stationary engines were and assumed that readers wouldn't know either. He or she wrote: "These stationary engines can often be seen at agricultural shows, where enthusiasts delight in operating their machines for the public, pumping coloured water from one bucket to another."

So there you have it now we know what stationary engines are! I'm grateful to Steve Lacey of Attenborough for supplying me with that entertaining press cutting.

Gordon Wright



AGENTS

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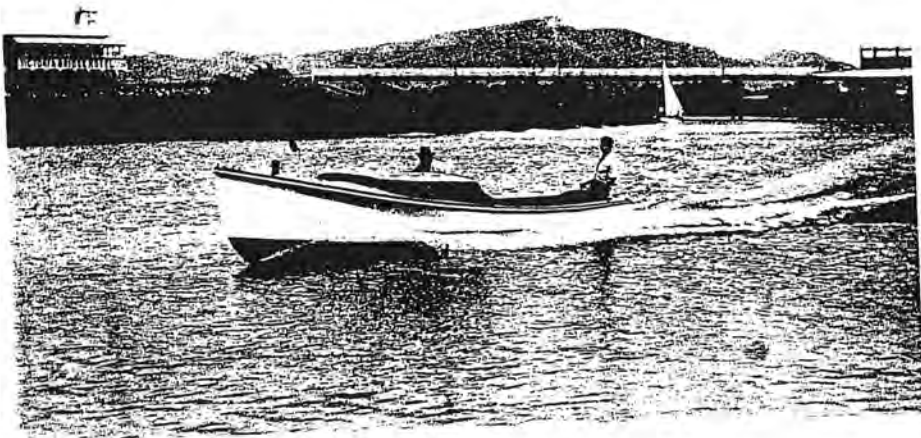
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VICTORIA BRIDGE
TOWNSVILLE

ALLOM
LOVELL
ARCHITECTS
BRISBANE

1 INTRODUCTION

The Victoria Bridge in Townsville was constructed between 1884 and 1889 to provide access from the main part of the city across Ross Creek to South Townsville. A rare example in Australia of a gas powered "swing bridge", the Victoria Bridge in Townsville was constructed in that manner to make best use of the shallow depths of the Ross Creek channel.

The bridge was closed to traffic in 1975, and in the mid 1980s it was heavily modified with the construction of an enclosed retail facility over the original carriageway. Major alterations to the bridge at this time included the removal of the approaches on both sides.

1.1 BACKGROUND

The Victoria Bridge in Townsville has been recognised for its cultural heritage significance. The bridge is entered in the Queensland Heritage Register maintained by the Environmental Protection Agency of the Queensland government. It is also entered in the register of the National Trust of Queensland and in the Register of the National Estate of the Australian Heritage Commission.

The entry of a building or place in the Queensland Heritage Register can place certain restrictions on its future development and use. The approval of the Queensland Heritage Council is required if development is proposed to a place entered in the register. The heritage act defines the term 'development' quite broadly. It can include subdivision of the site, change of use of a building, or work that substantially alters its appearance.

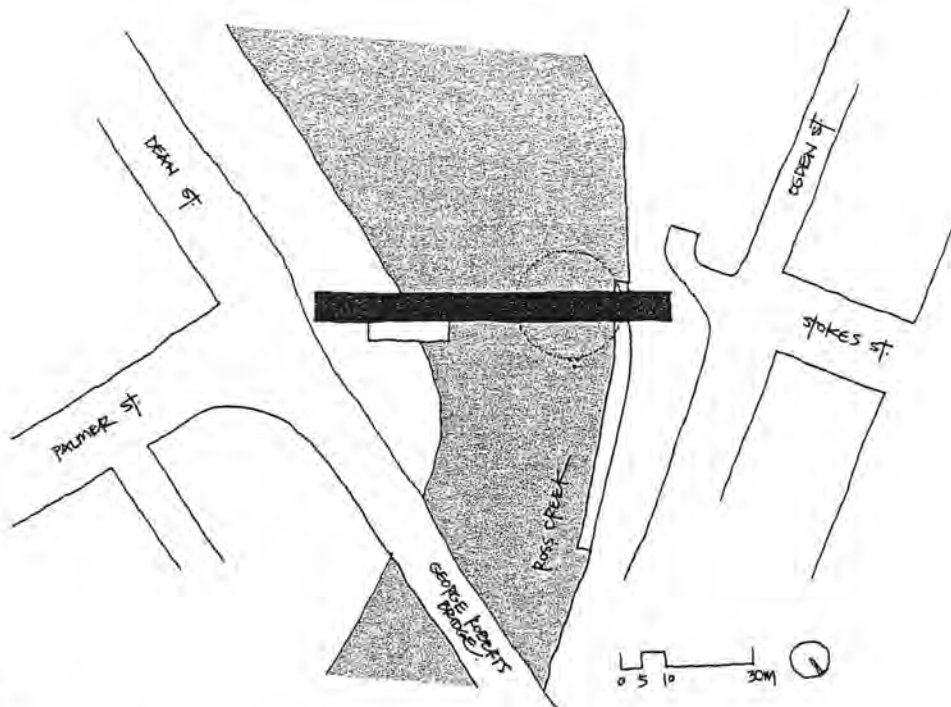
THE CURRENT PROPOSAL

The Townsville City Council proposes to undertake conservation work to the bridge to adapt it as a pedestrian bridge linking the city with South Townsville. The council has recently received funding from the Commonwealth government under the Cultural Heritage Projects Program 1999-2000 for this work, as part of its scheme to revitalise the inner city area of Townsville.

VICTORIA BRIDGE, TOWNSVILLE

1
INTRODUCTION

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1
A site plan of the Victoria Bridge which survives as a freestanding structure without the substantial earthworks which previously provided access onto the bridge.

1.2 THIS STUDY

This conservation plan was commissioned by the Townsville City Council as the first stage in its conservation and adaptation of the bridge structure.

It has been prepared following the basic guidelines of the *Burra Charter* of Australia ICOMOS, the accepted standard for conservation work in this country.

Much of the historical material in this report draws on from prior investigations into the bridge carried out by the Townsville City Council over the years, including historical material prepared by engineer Colin O'Connor and historian Dorothy Gibson-Wilde.¹

2 HISTORY

When the Victoria Bridge was constructed in the mid to late 1880s, Townsville was a town and port of some importance in the colony of Queensland, although the natural qualities of the harbour and the port were quite poor.

2.1 THE CITY OF TOWNSVILLE

Townsville was established by Europeans as a port in 1864, in association with the pastoral expansion of the time. Pastoralists had pushed the frontier of European settlement north as far as Rockhampton by the late 1850s. In search of additional productive runs, pastoralists continued moving north along the

VICTORIA BRIDGE, TOWNSVILLE

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3

Queensland coast and inland. The land had been divided into pastoral districts to facilitate administration, and a new district in north Queensland, the Kennedy, was opened for pastoral development.

THE NEED FOR CLOSER PORTS

Port Denison, a port to the south of Townsville had been established in 1861, at an area of the coastline that had a fine natural harbour with good depths for shipping. The town that developed around this port was called Bowen. But the lines of communication from the pastoral holdings inland to Bowen were poor, even though it had such a fine harbour. Attempts were made to find an area on the coast that gave better access.

To the north the colonial government had settled on Cardwell as another port, but this too was hindered by poor access. Cleveland Bay, at a point on the coast in between Bowen and Cardwell, was recommended to the Queensland government as a suitable site for a port by two pastoralists, Robert Towns and John Melton Black. The site was also part of Black's pastoral holdings, and it was here that the city Townsville was established from late 1864. The town was proclaimed a port of entry in 1865 and the first surveys of land were undertaken in the town area. Black developed a wharf and store along the northern bank of the creek and later a further series of private wharves were constructed. Land was sold and a small settlement began to develop around the creek. In the space of a few years, Townsville supported banks and hotels, wharves and stores, and a local newspaper.

By the mid 1860s wool was being shipped through Townsville instead of Bowen. Gold discoveries in the inland areas west of Townsville in the 1870s, in Ravenswood and Charters Towers, improved Townsville's prospects considerably. Townsville was chosen by the government as the rail head for the great northern railway in 1877, and in the 1880s, the northern centre for the Supreme Court was moved from Bowen to Townsville in acknowledgment of the northern city's pre-eminence in the region.

PORT DEVELOPMENTS

Although Townsville had an inferior harbour to both Cardwell and Bowen, it grew to be the dominant port of the northern part of the colony throughout the late nineteenth century. It was the outlet for a large amount of produce from the hinterland, the rich sugar growing, mining and pastoral districts.

The early port infrastructure was developed around the immediate town area, around Flinders Street East, and along the northern side of the Ross Creek. The customs house was constructed at the eastern end of Flinders Street, near its corner with the Strand, while a series of wharves were built alongside the water frontage. Warehouses were constructed along Flinders Street to accommodate shipped goods.

From early on in the development of the port the harbour was found to be quite shallow. In 1866 the low water depth in Ross Creek was all of 1½ feet, or 0.46 metres, and it was possible to walk across the mouth of the creek at low tide². There were contemporary reports of passengers on the monthly steamers either being landed on slippery rocks, or were stranded waiting for the tide to allow the small launches to float over the bar which *blocked the entrance to a mangrove fringed and alligator infested creek on the banks of which a wharf or two had been erected*.³ Large ships could not be accommodated – these were forced to anchor in the bay and cargo and passengers were brought to shore in lighters.

To remedy the problems of the port the decision was made in the mid 1870s to move the port downstream to the entrance of Ross Creek. A series of stone breakwaters were constructed into the bay to protect this entrance, forming the basis of the artificial outer harbour at Cleveland Bay.⁴ Dredging of Ross Creek was undertaken to improve depths at the wharves to 6 feet (1.83 metres) at low water mark.⁵ Importantly, the new port was to be developed largely on the southern side of Ross Creek, opposite the main area of the town. The hospital, pilot station and immigrant barracks were located on the southern side of Ross Creek, and there was potential for further development. Improving communications across the creek was of vital importance.

Improvements to the port and the development of the outer harbour continued over the following decades. With this construction the port of Townsville moved downstream from its original location to the outer harbour, and by the turn of the century wharves had been constructed on the inward side of the eastern breakwater to take advantage of these improved depths.⁶

2.2 THE VICTORIA BRIDGE

The construction of a bridge across Ross Creek was first suggested in 1875.⁷ Possible locations were either at the end of Stokes or Denham Streets, as well as the ferry end of Flinders Street. There was some indecision and argument over the choice of site between residents of Townsville and government officials in Brisbane, until finally the Flinders Street site was chosen. It was imperative that access to the wharves upstream in Ross Creek was not hindered with the construction of this bridge. As a result, a timber drawbridge was designed. Tenders were called for its construction in late 1877, and in 1879 the bridge was completed, at a cost of about £3,000. However it was an abject failure and was never put to proper use. Later in that same year the government announced that it proposed to remove the bridge from the creek.

Shortly after members of the Townsville council once again pressed the colonial government on the importance of the bridge. Developers of residential estates in South Townsville, realising the benefits they would derive with a connecting bridge, offered to assist in the funding of the bridge, as indeed did individual property owners. In 1884, a sum of £5,000 was allocated in estimates for a Ross Creek bridge. In May of that year the Premier of the colony visited Townsville and was met by a group of local citizens. Later the colonial Engineer for Bridges, JH Daniells, also visited the town and inspected the site for a proposed

bridge. He favoured a site in Blackwood Street, but another site was also proposed for Stokes Street. Whatever bridge that was built still had to provide access for vessels upstream, and given the topography of the Townsville city area some type of moveable bridge was necessary.

The construction of a bridge across the creek became even more important by the mid 1880s, when the railway line was constructed to South Townsville to the port facilities there. As a result, in 1885 the engineer Daniells was instructed by the colonial government to prepare plans for a swing bridge over Ross Creek, linking Stokes Street to Palmer Street across the creek. It provided access for both vehicles and pedestrians, with narrow footpaths on each side.

CONSTRUCTION

In July 1885 tenders were called for the construction of the new bridge across Ross Creek to South Townsville. The bridge designed by Daniells was unlike the earlier Ross Creek bridge, which was a drawbridge.

The new bridge across Ross Creek would be a "swing" bridge, and be constructed of metal girders. A swing bridge was one that had a central section that rotated about a vertical axis, on a central cylindrical pier. In operation the moveable section of the bridge rotated through 90 degrees until it was perpendicular with the main structure of the bridge. This then offered space on either side for the passage of ships.

In October 1885 the contract for the supply of materials and erection of the bridge was awarded to GH Royce and Co of Sydney. The contract price was more than £18,000, more than half of which went on supply of materials. At the time Australian heavy manufacturing was quite basic and as a result the steel required for the bridge was constructed in England and then shipped to Townsville. The gas engine that powered the swinging mechanism was manufactured by Crossley Bros of Manchester, and was an Otto & Crossley patent. Only a small number of these engines were imported to Australia in the late nineteenth century. As designed the bridge would allow when opened two clear spans, measuring almost 60 feet each, for the passage of vessels.

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A report was published about the bridge in the local Townsville newspaper in 1887, part-way through its construction. The following excerpts reveal some of the technical details of the bridge:

2
Victoria Bridge during construction ca 1888 [John Oxley Library; Neg no. 9689]

This bridge is the most important work yet undertaken by the Engineer for Bridges (Mr JH Daniells) in this colony. The total length overall of the swing and fixed bridges will be 550 feet, the structure being both ornamental and substantial. The swing portion will consist of two main girders 160 feet in length, the top flanges being parabolic in shape. The top and bottom flanges will be connected by what are known as plate webs. The flange plates and angle bars, as well as the cross girders, will all be of Bessemer steel^B. This will have the effect of materially decreasing the weight of the swing bridge. For this reason, also, the carriage way of the same portion will be laid with timber.

The arrangement for opening and closing the bridge form an interesting study. The swing portion will revolve on sixteen cast steel cylindrical rollers running on a bottom roller path. This path is bolted to the large cast-iron cylinder which forms the main pier, which is founded on the rock in the bed of the creek at a depth of 7 feet. The cylinder is lined with cement concrete, varying in thickness. This lining very materially stiffens the pier, and of course, greatly increases its strength. Inside this pier a small cylinder, 6 feet in diameter, is inserted thus forming not only the pivot on which the bridge will swing but also serving as a casing for the accumulator which will form a portion of the hydraulic apparatus for opening and closing the bridge...Cylinders and rams will be fixed under the footways and will act upon two 1¼ inch chains which will be attached to the

AK p.8

VICTORIA BRIDGE, TOWNSVILLE

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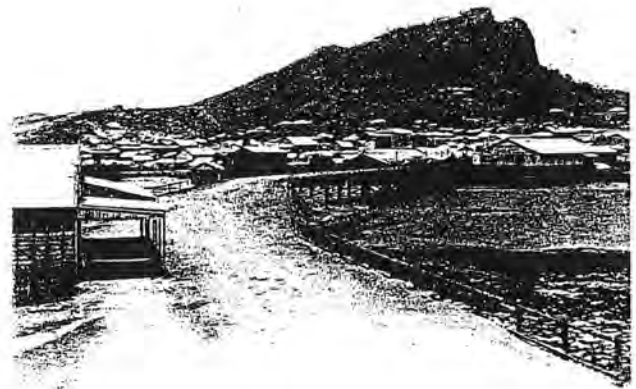
HISTORY

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bottom roller plate. One of these chains will open, the other will close the bridge...The accumulator will be charged by three small pumps to be driven by an Otto and Sangué's (sic) gas engine of 6 h.p., accommodation for which has been provided in the engine room of the main pier. When open the bridge will give a waterway of 63 feet for the passage of vessels up and down the creek...

When closed, each end of the swing bridge will rest on piers consisting of two cast iron cylinders, each 6 feet in diameter. To prevent any "sagging" of the girders, and in order to preserve the centre line, four wedges will be inserted, one under each corner of the swing girders. These will be put into or removed from their positions by four small hydraulic cylinders, the power for which will also be supplied by the central accumulator. The fixed part of the bridge will consist of ten iron spans, seven on the Ross Island side and three on the Townsville shore...The carriage road over the fixed spans will be formed by buckled plates upon which tarred road metal will be laid. The width of the roadway between the footpaths will be 21 feet 6 inches on the fixed spans, and 16 feet 10 inches on the swing. The footpaths throughout the length of the bridge will be 4 feet wide and will be properly curbed and guttered.⁹

As designed and constructed the bridge was much higher than the surrounding streets. Long approaches on either side of the creek were necessary at both Stokes and Palmer Streets to enable proper access for both vehicles and pedestrians.



By May 1889 the bridge was sufficiently complete to allow pedestrians to walk across it. Its official opening was some time away. Faced with this form of irreversible competition the resident ferry driver lost many customers and quickly went out of business.

In July 1889 the bridge was completed. It was handed over to the Townsville council at an official opening ceremony hosted by the Townsville Mayor, Alderman JN Parkes. At this time the first reference was made to the bridge as being called the "Victoria Bridge"; no doubt named after the monarch Queen Victoria, who had celebrated her golden jubilee in 1887. A caretaker was appointed to be in charge of opening and closing the bridge. Almost

3
A view of Victoria Bridge from West Townsville shortly after construction on the left and a view of the approach from Palmer Street ca 1896. [JOL; Neg No.98775]

immediately shipping companies requested that the bridge be put into service to allow its ships to travel upstream.

THE SWING BRIDGE

The Victoria Bridge was the first swing bridge known to be constructed in Queensland. Other moveable bridge types of the late nineteenth century were the lift bridge (where the central moveable section is raised above the bridge level by hydraulic power) and the "bascule" bridge (like a draw bridge). There is no evidence as to why Daniells chose this particular moveable bridge technology over the others.

While such swing bridges were not common in Queensland there were precedents in other parts of Australia and in England. The Townsville bridge was similar to another bridge constructed in Sale in Victoria in 1883, that had similar span widths. At the time, the bridge at Sale and the Victoria Bridge were the largest swing bridges in Australia. They held this honour until the early 1900s, when the Glebe Island and Pyrmont Bridges were constructed in Sydney.¹⁰

The swing bridge at Sale was slightly different in that it was a metal truss bridge (rather than girder), and was operated by hand, while the Glebe Island and Pyrmont bridges were powered by electric power. The 'swinging' mechanism in most swing bridges was powered by steam, and later electricity. In a departure of sorts the swinging mechanism of the Townsville bridge was gas powered rather than steam powered. Most swing bridges were operated from a control tower located above the decking. In another departure the Victoria Bridge was operated from a point beneath the decking at the top of the main cylinder, accessed via a small manhole set within the bridge decking.

THE DESIGNER

The designer of the bridge, the engineer and architect John Henry Daniells, had a rather chequered career in Queensland. After studying in England, Daniells worked as an engineer in that country and in Russia in the 1860s and 1870s before coming to Australia. He worked as an engineer in the railways in New South Wales and arrived in Queensland in 1884 where he was appointed to the position of Engineer of Bridges in the Roads and Bridges Branch of the Queensland Mines and Works Department.

In this position Daniells designed a number of bridges for the Queensland government around the colony, apart from the Victoria Bridge. Iron bridges were constructed over the Endeavour and Annan Rivers in Cooktown, and over the Pioneer River in Mackay to Daniells's designs in the mid to late 1880s, the same time the Victoria Bridge was designed and built. A number of the bridges on the Cairns to Kuranda railway were designed by him. He also prepared a number of designs for bridges across the Brisbane River, including a proposed swing bridge at Edward Street. None of these were built. Daniells also designed bridges over the Mary River at Maryborough and the Burnett River at

At p16

VICTORIA BRIDGE, TOWNSVILLE

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Bundaberg, but these were not constructed and alternative designs by employees of the Railway Department were preferred.

For it was at this stage of Daniells's career that he began to run into difficulties. A number of his bridges had problems with tendering or construction. A bridge being constructed to his design across Breakfast Creek in Brisbane was found to be too short midway through construction, which led to his suspension from the department. Later, when the case reached arbitration and the government was forced to pay the local council additional costs, Daniells was dismissed from his position and replaced by AB Brady.

After his dismissal Daniells worked as an architect and engineer in Brisbane. He was forced into liquidation in 1891 during the general economic depression of the time, but recovered and designed a few buildings in Brisbane and in north Queensland, including Townsville.¹¹ It is not known if he designed any other bridges after the Breakfast Creek bridge.

PROBLEMS IN OPERATION

Only a few months after the opening the bridge began to cause trouble. Two ships owned by the Burns Philp company were left stranded upstream when the bridge would not open. A broken bolt was found to be the culprit. The Town Solicitor warned that the council was liable for compensation to the shipping company for this inconvenience, which was duly paid.

In October 1889 repairs were performed to the bridge to make good the damage. By that time three bolts had broken in the same place – these bolts kept the rollers in their proper position on the roller path. However in December of that year the bridge again did not open properly due to the failure of a radial bolt, and further claims for compensation from ship-owners were forthcoming. The railway wharf was upstream from the bridge and steamers regularly brought coal to wharves. These could not be detained due to a defective bridge.

As a result of these failures, the government's newly appointed Engineer for Bridges, AB Brady (who had replaced JH Daniells) visited Townsville to investigate the matter. The opening mechanism of the bridge was tested frequently during Brady's stay and found to be working properly, the centre span opening in the space of 35 seconds. However, while he observed that the contractor had carried out the job well, and that the gas engine, hydraulic machinery and appliances were well built and in good working order, he felt there were a number of other problems with the overall design. It was awkwardly positioned at a sharp angle from Stokes Street, and the "central" span was placed too close to the city side of the creek meaning that only one of the openings was able to be used for navigation. As a result the bridge was closed to road traffic longer than it should have been. He also felt it was built too high from the street – higher than shown in the contract drawings. This was done, Brady thought, to keep the engine room and machinery above the high tide and flood level.¹²

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Despite Brady's visit and experience with the trial of the swinging mechanism the bridge continued to under-perform. In early 1890 the caretaker of the bridge prepared a list of improvements and repairs that were necessary to repair the swing mechanism. Further problems were experienced and the council announced that 12 hours notice was necessary from shipping companies before the bridge could be opened. Additional claims for damages were made with bridge not working properly and the then caretaker resigned in June 1890. A new caretaker was appointed and for a short period from then the bridge was opened manually. This was found to be the cheapest and easiest method of opening the bridge. Council continued to pay a number of claims for demurrage (the rate or amount payable to shipowner for failure to discharge ship in time allowed). These claims were for up to £10 at a time, which were relatively substantial sums.

Although the bridge had not operated at an optimal level since its opening, it still enabled the port of Townsville to function to a degree. In 1896 it was reported that in the last two years the bridge had been opened more than 1,000 times, and more than 1,500 vessels had passed through the bridge and beyond.

As mentioned earlier the port of Townsville was a relatively busy one. With the numbers of ships using the Ross Creek, it was somewhat difficult to avoid damage to the bridge. In 1909 a ship and lighter tried to pass through the bridge together. Both vessels collided with bridge, and damaged part of the scaffolding and hand rails. Repairs were undertaken to ameliorate the damage. In the next year another ship hit the bridge and damaged some of the ironwork. As a result, in 1912 a report was prepared about the bridge by an employee of the Townsville City Council, which inter alia stated the following:

The repairs to the bridge have been fairly well maintained for the last 18 years. Previous to that the working and looking after the bridge was let by contract, and there were no provisions made in that contract to keep the bridge painted and free from rust...After the expiration of the above contract, steps were taken to have the bridge scraped and painted. During the progress of this work it was seen that some of the angle irons of the girders of the swing had rusted away...

The hydraulic machinery for the working of the bridge never worked satisfactorily and had to be abandoned and the bridge worked by hand. In 1896 a portion of the south bank underneath the bridge was washed away, with the result that two of the cylinders which were not in bedrock dropped 4 feet 6 inches. Also that portion of the bridge dropped with the cylinders. Steps were taken to have the bridge raised to its original level. (Chief Engineer for Railways HC Stanley) recommended that piles be driven and that the bridge be raised and supported on the piles. This was done and the piles are still supporting that portion of the bridge, and are in good condition.

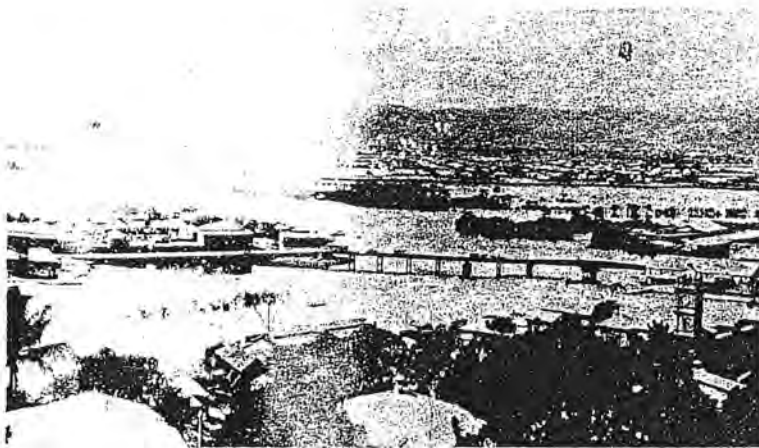
It was after the preparation of this report that the council first suggested closing the bridge. Since its opening in 1889 the bridge had not functioned without difficulty; the swing mechanism had continually failed and more often than not

the bridge had to be operated by hand. The bridge was also in danger of becoming redundant – since its original construction much of the port activity had moved downstream from the bridge and there was less need for it to open to allow vessels to pass through. Alternatively the council offered the state government the responsibility for the operation and maintenance of the bridge. In 1913 the Townsville City Council proposed that a new bridge be constructed at another location in the city, at Stanley Street.

In 1923 the Townsville council applied to the state government for the permanent closure of the swing section of the bridge. A report into the bridge made at that time found that overall the bridge was in good condition – the main steel girders of the bridge were in good order. The cross girders of the swing span were badly corroded while the timber decking was in poor condition.

THE BRIDGE CLOSES

In 1925 the *Townsville Bridges Act* was passed by the Queensland parliament. This authorised the closure of the swing mechanism of the Victoria Bridge. The bridge did however remain open to vehicular traffic. Not long after this legislation was passed a new bridge was constructed at Stanley Street to the west of the Victoria Bridge.



With changes in the urban development of the city the Victoria Bridge was no longer needed as a thoroughfare. It was closed to traffic in 1975. The George Roberts Bridge had been constructed over the creek from Denham Street to Dean Street in South Townsville at this time to accommodate vehicular traffic.

4
A view of the Victoria Bridge during flood and after the closure of the swing mechanism ca 1925. [JOL Neg Nos. 61074 & 116718]

Initially after its closure the Victoria Bridge faced an uncertain future. It was unused for some time and began to fall into disrepair. The Townsville City Council had proposed to demolish the bridge but there was widespread public opinion against this idea and instead the council decided to retain the structure. Few swing bridges like the Victoria Bridge had been built in Australia – and after some investigation it was discovered that there was only a very small

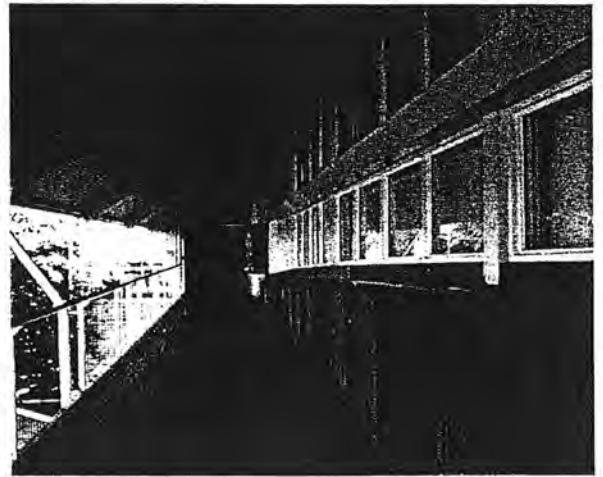
VICTORIA BRIDGE, TOWNSVILLE

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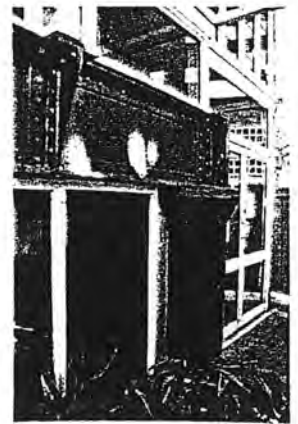
number of swing bridges surviving in England. Although most of the bridge was retained, including the central swinging section, the approaches on both sides of Ross Creek were removed.



After some years of inactivity the former Victoria Bridge was leased to a commercial company and converted into a retail facility. This conversion required a great deal of alteration to the surviving original structure of the bridge. The carriageway was completely enclosed with new material and a series of retail tenancies were created within this space. Office areas were accommodated in the lower sections of the bridge structure.

5
Conversion of Victoria Bridge into a retail facility involved the enclosure across the length of the span and to lower sections of the structure. [Allom Lovell]

Parts of the original structure were retained and incorporated within the new facility, namely the curved steel beams within the swinging section of the bridge (Refer to drawings in the Appendix of this report). The original steel balustrading was removed, although parts of this balustrading were reused in the adjacent seafood restaurant (where it still survives). Pedestrian access across the bridge was also provided within the facility.



Although not used for many years, the gas engine that powered the swinging mechanism had survived in-situ in the engine room within the central cylinder.

6
Parts of the original structure were retained and incorporated into the new work. [Allom Lovell]

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Experts from overseas have stated that this engine is a very rare industrial specimen from the late nineteenth century period. It was however removed from its original location and it was not until a few years later that it was eventually returned to beside the bridge in a display on the northern side of the river.

The newly redeveloped Victoria Bridge centre provided tourist centred retail and café facilities. However since its opening it struggled to succeed as a viable retail area. In the mid 1990s the Townsville City Council investigated the possibility of redeveloping the site into a cultural facility but this did not eventuate. It has been all but empty for some time apart from a restaurant on an adjacent site on the city side of the bridge and Council training areas on the lower floor of the building.

The Townsville City Council has embarked recently on a scheme to revitalise the city centre area. The former Victoria Bridge is seen as an important component within this revitalisation.



3 UNDERSTANDING THE SIGNIFICANCE

Cultural significance is the term used to embrace the range of qualities that make some places especially important to the community, over and above their basic utilitarian function. These places are usually those that help understand the past, enrich the present, and that will be of value to future generations.

3.1 THE BURRA CHARTER

The standards for establishing cultural significance in this country are most often done in accordance with a document called the *Burra Charter*, prepared by Australia ICOMOS, a group of conservation professionals concerned with the care and conservation of historic buildings. This charter helps explain cultural significance as a concept that assists in estimating the value of places over and above their utilitarian function.

The *Burra Charter* defines cultural significance as aesthetic, historic, scientific or social value for past, present and future generations.

3.2 THE CRITERIA FOR ASSESSMENT

The definitions of cultural significance in the *Burra Charter* are quite broad. Heritage legislation in this country has taken the thrust of these definitions of cultural significance and expanded them, but also refined them, to make the assessment process more manageable in legislative terms.

THE QUEENSLAND HERITAGE ACT

The Queensland Heritage Act 1992 expands the four broad areas of significance into eight criteria of cultural heritage significance. This Act states that a place may be entered in the Queensland Heritage Register (QHR) if it is of cultural heritage significance and satisfies 1 or more of the following criteria:

- (a) *the place is important in demonstrating the evolution or pattern of Queensland's history;*
- (b) *the place demonstrates rare, uncommon or endangered aspects of Queensland's cultural heritage;*
- (c) *the place has potential to yield information that will contribute to an understanding of Queensland's history;*
- (d) *the place is important in demonstrating the principal characteristics of a particular class of cultural places;*
- (e) *the place is important because of its aesthetic significance;*

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- (f) *the place is important in demonstrating a high degree of creative or technical achievement at a particular period;*
- (g) *the place has a strong or special association with a particular community or cultural group for social, cultural or spiritual reasons; and*
- (h) *the place has a special association with the life or work of a particular person, group or organisation of importance in Queensland's history.*

3.3 STATEMENT OF SIGNIFICANCE

The Victoria Bridge was the first permanent vehicular bridge constructed in Townsville across Ross Creek. The bridge demonstrates the provision of public infrastructure in the northern Queensland city of Townsville in the late nineteenth century, and is an important surviving example of that infrastructure of the time. Its construction assisted the economic and urban development of the port and the town in the late nineteenth century, through the improved access that was given to both South Townsville and the central city. The bridge also demonstrates the growing importance of road-based transport in the late nineteenth century, not only in Townsville but also Queensland.

The Victoria Bridge is significant historically as one of the oldest surviving road bridges in Queensland. Earlier bridges survive but these predominantly are rail bridges, although the Dickabram Bridge over the Mary River (constructed between 1884 and 1886) is a combined road-rail bridge. Road bridges contemporary with the Victoria Bridge that survive include the Annan and Endeavour River Bridges outside of Cooktown (although only part of the Endeavour River Bridge survives). Both bridges were designed by JH Daniells, designer of the Victoria River Bridge. Other heritage listed bridges in Maryborough (the Lamington Bridge) and Bundaberg (the Burnett Bridge) were constructed in the late 1890s.

The Victoria Bridge is the only known swing bridge in Queensland and one of few swing bridges surviving in Australia. Swing road bridges survive at Sale (constructed in 1883), and there are two in Sydney (both built in the early 1900s). These bridges however demonstrate different construction techniques to the Victoria Bridge. A rail bridge at Leith in Tasmania is another example of a metal girder swing bridge, like Victoria Bridge, which was built in the mid 1880s.

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7
*The Pyrmont swing Bridge
in Sydney constructed in
1902. [O'Conner, C;
Spanning Two Centuries,
Historic bridges in Australia;
p 48]*

Overseas the number of surviving swing bridges is not known precisely, but it is thought that very few swing bridges survive. Although the swing mechanism has not worked for many years the machinery is thought to be relatively intact, which increases its value in this regard. The Otto and Crossley gas engine, retrieved when the bridge was redeveloped, is also rare and is thought to be one of only two examples of this type of engine imported to Australia in the late nineteenth century.

The design and construction of the Victoria Bridge in the mid 1880s represents a technical achievement for the nineteenth century period in terms of bridge building in Queensland and Australia. With a swinging span of close to 23 metres the Victoria Bridge was the largest swing bridge in Australia at the time of its construction and was so for some years.¹³ Notwithstanding the technical difficulties experienced during its operation the Victoria Bridge represents a technical achievement in regard to the technology of the time.

Despite the alterations made to the bridge in the 1980s and the removal of both street approaches the Victoria Bridge remains a prominent feature of the townscape of central Townsville. It has aesthetic value in terms of its visual contribution to the urban form of the city. The steel construction of the bridge and the surviving machinery elements have an industrial aesthetic. The patination of these elements demonstrate their long use over time and contribute to this aesthetic quality.

4 CONSERVATION POLICY

The purpose of the conservation policies set out in this section is to provide a guide to the development and care of the Victoria Bridge in ways that retain its significance. The policies aim to:

- recover the integrity of the site;
- identify elements which adversely affect the place and which should be modified or removed;
- provide an approach to the conservation of significant fabric;
- permit adaptation and new works which will return the place to an important one in the memory of the community.

The policies are set out in italics and are accompanied by information on which they are based and followed by an explanation of likely implications. Policies should be read in conjunction with the associated text.

4.1 APPROACH

The significance of the Victoria Bridge lies not only in its importance to the city of Townsville as a remnant of the nineteenth century development of the city but as a place of national significance being one of only a few metal girder swing bridges which survive in Australia and being one of the oldest surviving vehicular bridges in Queensland.

Although the approaches to the bridge have been removed resulting in the isolation of the bridge from the city and making it a remnant from the past, the bridge does survive with the swinging mechanism, the supports for the open bridge and the gas powered engine. All of these components are significant in their own right and collectively make the bridge one of the most important in Australia.

The modification of the bridge in the middle of the 1980s which sought to find a new and financially viable use for the bridge resulted in not only the degradation of the aesthetic significance of the bridge but in the loss of significance through the removal of important fabric. The removal of that work should be seen as an important strategy in revealing the cultural significance of the place to the community.

Any new use or adaptation of the bridge should seek to carefully conserve the significance of the bridge. New uses should seek to re-establish the structure as a link between the north and south of the city and as an important part of the local context.

ACTION INFORMED BY SIGNIFICANCE

The significance of the Victoria Bridge is set out in full in earlier sections of this document. It is essentially as a remnant of the historical development of



**SUBMISSION TO THE NATIONAL
ESTATE FOR FUNDING TO
RESTORE THE VICTORIA BRIDGE
IN TOWNSVILLE**



MAY 1980

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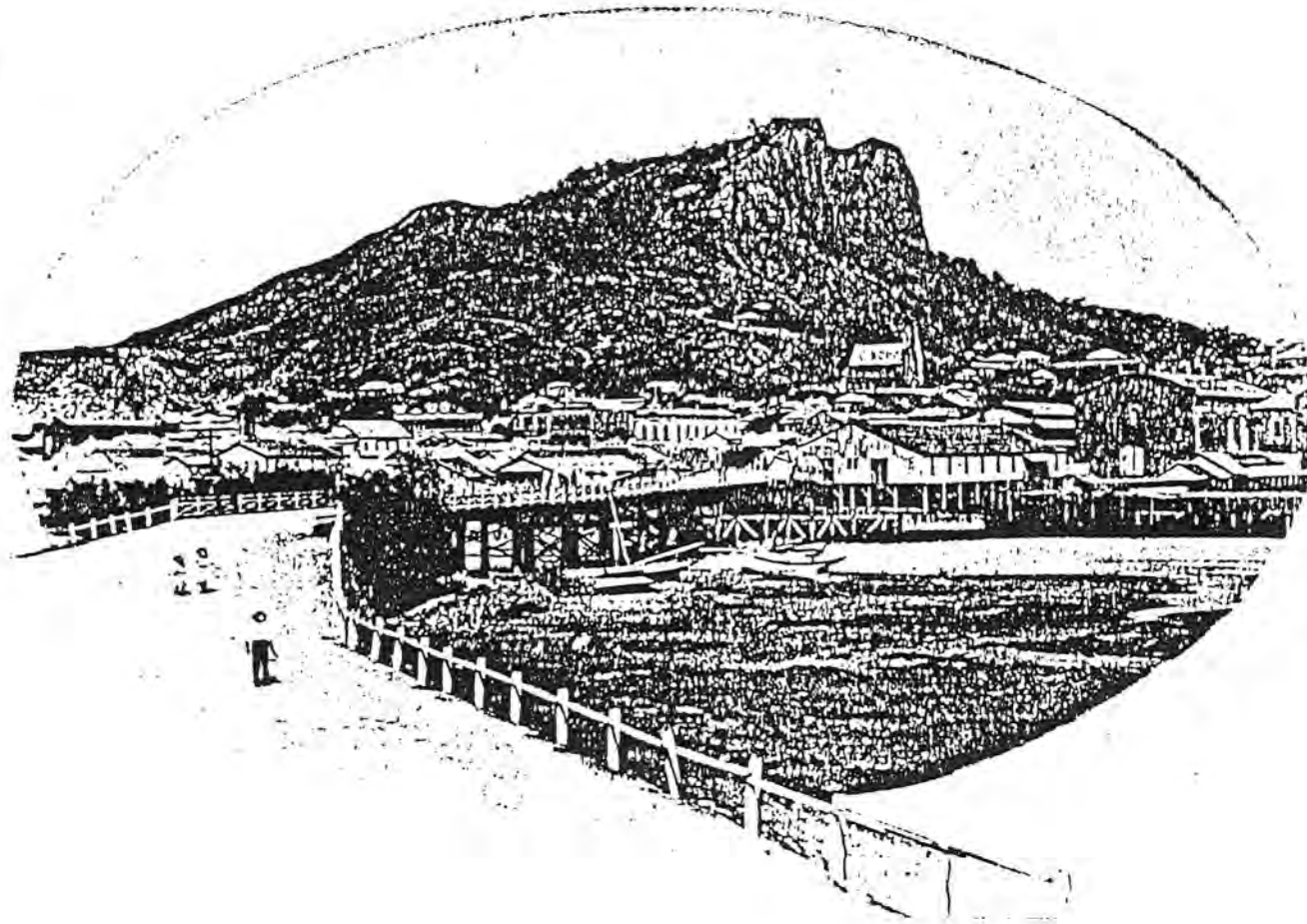
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introduction

The Townsville City Council has spent considerable time and effort researching the feasibility of restoring the Victoria Bridge. This unique bridge spans Ross Creek and is conveniently sited in the Inner City Area, linking the major shopping area with the commercial area of South Townsville.

Victoria Bridge restoration has the support of the National Trust of Queensland. The historic bridge was included in the Register of the National Estate in 1977.

An advisory committee consisting of staff, aldermen and community representatives has documented the relevant detail about Victoria Bridge and has set down the following major aspects of proposed restoration.



Victoria Bridge 1902.

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historical significance of the victoria bridge

Victoria Bridge was built across Ross Creek at Townsville between the years 1887 and 1889. It is a steel swing bridge, although the swing section was wedged shut about 1924. The decision to build a swing bridge was made by the Queensland Government in 1884. In 1885, plans were prepared by J. H. Daniells, Government Engineer for Bridges. The contract for both supply of materials and erection was awarded to G. H. Royce & Co. of Sydney. Royce immediately set up an office in London and ordered the materials. The steel pipes were manufactured by Head Wrightson & Co. of Middleborough, England, the superstructure by Messrs. LeCoq of Halle, Belgium and the hydraulic machinery by Owens & Co. of White-frairs, London. The gas engine was manufactured by Crossley Bros. of Manchester and was an Otto & Crossley's patent.

The bridge is somewhat unusual in design. Most swing bridges were operated from a control tower situated above the decking. Victoria Bridge was operated from a point beneath the decking, at the top of the main cylinder. Most bridges of this type were operated by steam in the case of earlier bridges or electricity in later examples. The use of gas to operate Victoria Bridge was unusual. The Otto & Crossley gas engine is now a rarity in the world. Otto only invented the

gas engine in 1876. It was he who also developed the diesel engine at a later date. Crossleys were famous as makers of engines, and many of the engines used in early North Queensland gold mines were made by them. The Principal Keeper of the Tyne and Wear Museum of Science and Technology, Newcastle-on-Tyne, England, states -

" I know of many museums (including this one) who would give their eye teeth for an example. "

Of the many iron and steel swing bridges built throughout the world in the late 19th Century, few remain. In Australia, four survive with one (Pymont, N.S.W.) about to be demolished. Of the remaining three, that at Sale in Victoria is the oldest (1883). It, however, was worked by hand and is of different construction from Victoria Bridge. The Glebe Island Bridge in Sydney, N.S.W., was built in 1901. It was operated electrically and also differed in construction from Victoria Bridge. Victoria Bridge is now unique in Australia. Research yet to be completed may well prove that it is unique in the world. The bridge and the machinery which worked it is of considerable interest to industrial archaeologists throughout the world.

It is important, too, in the history of the City

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of Townsville. From its foundation, all development in Townsville had clustered along the north bank of Ross Creek. The "harbour" consisted of wharves built along the creek bank. Large ships could not enter the creek, but moored in Cleveland Bay in the shelter of Magnetic Island. Goods and passengers were lightered to the wharves in the creek. Only the hospital, pilot station and immigration barracks existed on the southern side of the creek on Ross Island (now the suburb of South Townsville). These were reached by ferry. In 1875, with Townsville becoming an increasingly important port - for five gold fields, a growing pastoral industry and a rapidly developing sugar industry - the necessity to build a better harbour became urgent. This new harbour was built out from Magazine Island, on the southern side of the creek. It appeared to the people of Townsville and to the large merchant firms that the City centre would have to be moved to Ross Island unless a bridge could be built across the creek. A bridge was built in 1879. However, it was a dismal failure, blocking access to the wharves in the creek, and resisting all efforts to move its opening mechanism. It was demolished in 1879 without ever being used.

This did nothing to lessen demands, and with the building of the harbour works, population increased on Ross Island. Finally, in 1884, it was decided to build Victoria Bridge. Without it, there would undoubtedly have been two city centres in Townsville, one on the north bank of the creek and one on the south bank. Once it was built, however, the City centre on the north bank expanded rapidly. The earliest City centre in the eastern end of Flinders Street faded in significance and the

centre moved westward to the point where the bridge crossed the creek. Quite clearly, had a bridge not been constructed at that time, the City of Townsville could not have developed as quickly as it did, nor would it have developed in the same way. Without a communicating link between north and south sides of the river, traffic flow from wharves to city and railway would have been greatly hampered, and a second city centre would have developed on the harbour side of the creek.

Built to accommodate loads of 20 tons, the bridge is known to have been loaded with up to 120 tons on occasion, and naturally enough required major maintenance. For some years, it was operated on a contract basis, by contractors employed by the City Council. The machinery was badly maintained. In design, it appears to have been ahead of its time. The engineers failed to allow for expansion and contraction of the steel in the swing section in the extreme heat of the tropics - an eventuality which they probably could not have foreseen without experience. However, the bridge did work adequately, though turned by hand for the major part of its history. It is believed to have been opened on an average of twice a day for some years. After its closure, it continued to serve the City of Townsville well. During World War II, it was a major link in conveying troops and supplies, as well as equipment from the harbour to the many camps which surrounded the City. Countless convoys passed over the bridge in the tense period when Japan threatened the North.

Victoria Bridge, in fact, was a major factor in the development of the City of Townsville.

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Victoria Bridge is significant in the local history of the development of the City of Townsville, at State level, as the only iron swing bridge remaining in Queensland, at National level, being the only swing bridge of its kind left in Australia, and at international level as one of the very few 19th Century iron swing bridges remaining in the world. Its gas engine is also a world rarity. It must be considered an extremely important element in Queensland's industrial archaeological heritage.

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current condition of the victoria bridge

Opening and closing of the Victoria Bridge was achieved by use of hydraulic machinery located in the central swing pier of the bridge.

The machinery comprised a 6 h.p. single cylinder Otto gas engine driving a three throw hydraulic pump through 4:1 reduction gearing. The hydraulic pump charged an accumulator, also located in the central pier, and the stored hydraulic energy in the accumulator was used to operate a system of hydraulic rams and chains to open and close the bridge. To avoid sagging of the central swing span when in the closed position, the ends of the span were supported on wedges bearing on the fixed spans. Removal and insertion of these wedges was also achieved hydraulically using the stored energy of the accumulator.

Details and dimensions of the Otto gas engine are not known at the present time other than the fact that it is a horizontal, single cylinder engine. The nameplate from the engine has been salvaged and cleaned and bears the inscription -

" Crossley Bros. Limited, Otto &
Crossley's Patents, Manchester. "

The means of starting and cooling the engine are not apparent; however, the engine speed was regulated by a gear driven mechanical governor.

When inspected in March, 1980, the engine frame, cylinder, connecting rod, crankshaft, bearings, flywheel, governor and exhaust system together with some unidentified miscellaneous fittings and pipework were all intact. Notwithstanding partial submergence in salt water, the majority of the engine components appear to be in fair condition with the exception of the connecting rod, which has almost completely corroded, and possibly the exhaust system which was partly submerged in mud and silt.

The frame, bearings, eccentric sheaves and shaft of the hydraulic pump are intact, complete with the 9" diameter C.I. pinion wheel and 3'-0" diameter mortice wheel which provides the 4:1 reduction gearing between the gas engine and pump. The clutch and clutch operating mechanism between the engine and pump is also in place.

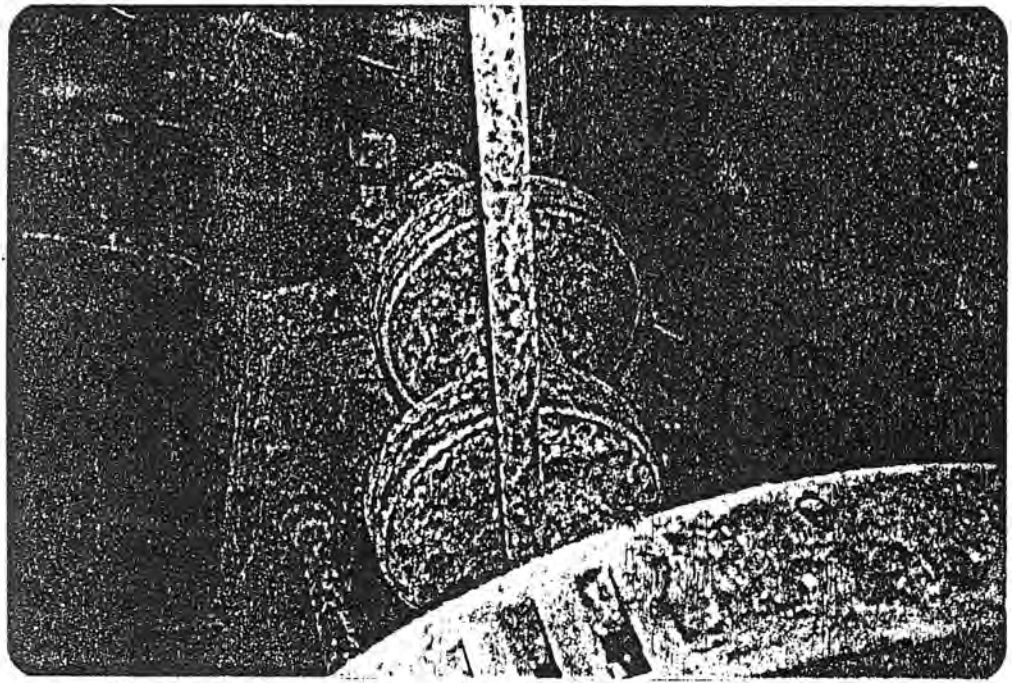
As with the gas engine, the pump is in fair condition although many of the wooden teeth in the mortice wheel are missing. A spare mortice wheel with C.I. teeth was found lying adjacent to the gas engine together with a single, badly corroded pump piston and eccentric strap. The remaining two pump pistons and eccentric straps appear to be missing.

It is assumed that the 8" diameter x 12'-6" stroke accumulator and associated 62 tons of C.I. weights are still located within the central pier; however, this could not be verified.

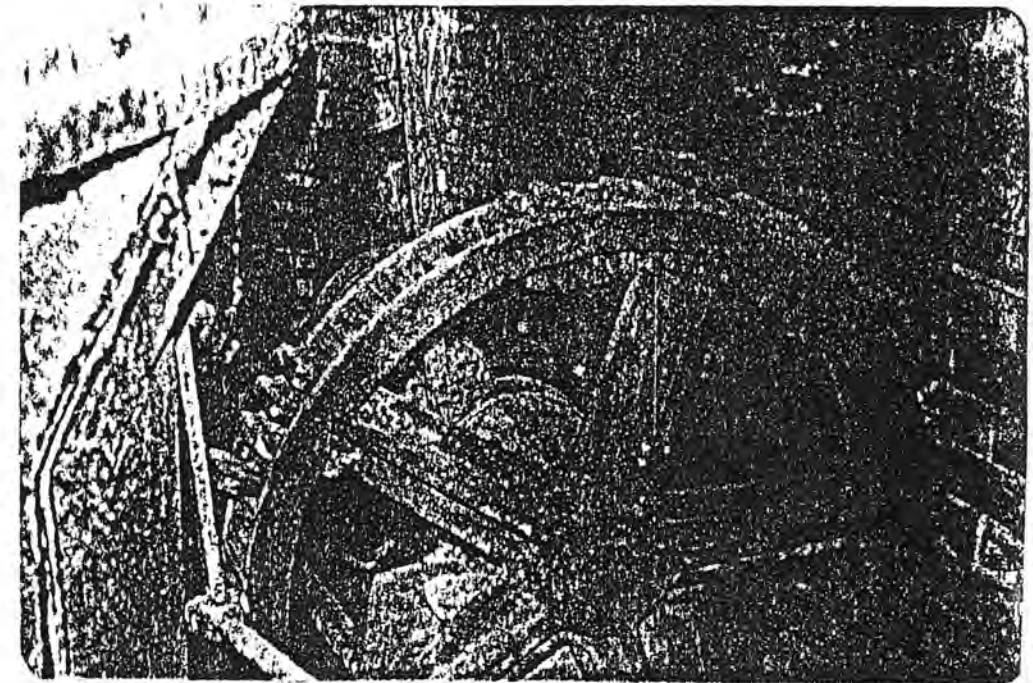
A5p8

The hydraulic cylinders and associated chain and pulley system used to open and close the bridge are still in place and in fair condition, however, the geared regulator valves to operate the mechanism are missing.

The drawings show a number of oil and water tanks located in the central pier which are missing and it is also apparent that much of the original pipework is incomplete.

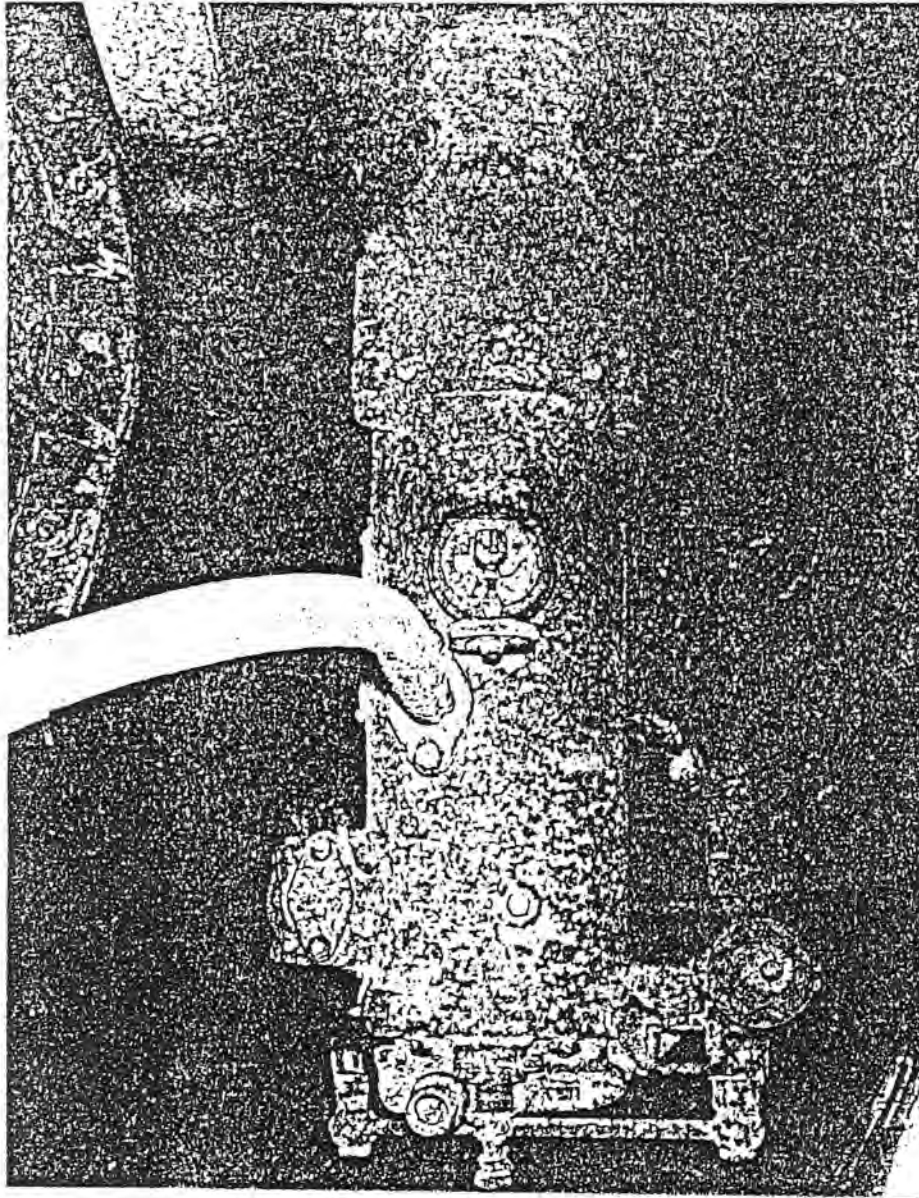


Pump Eccentrics

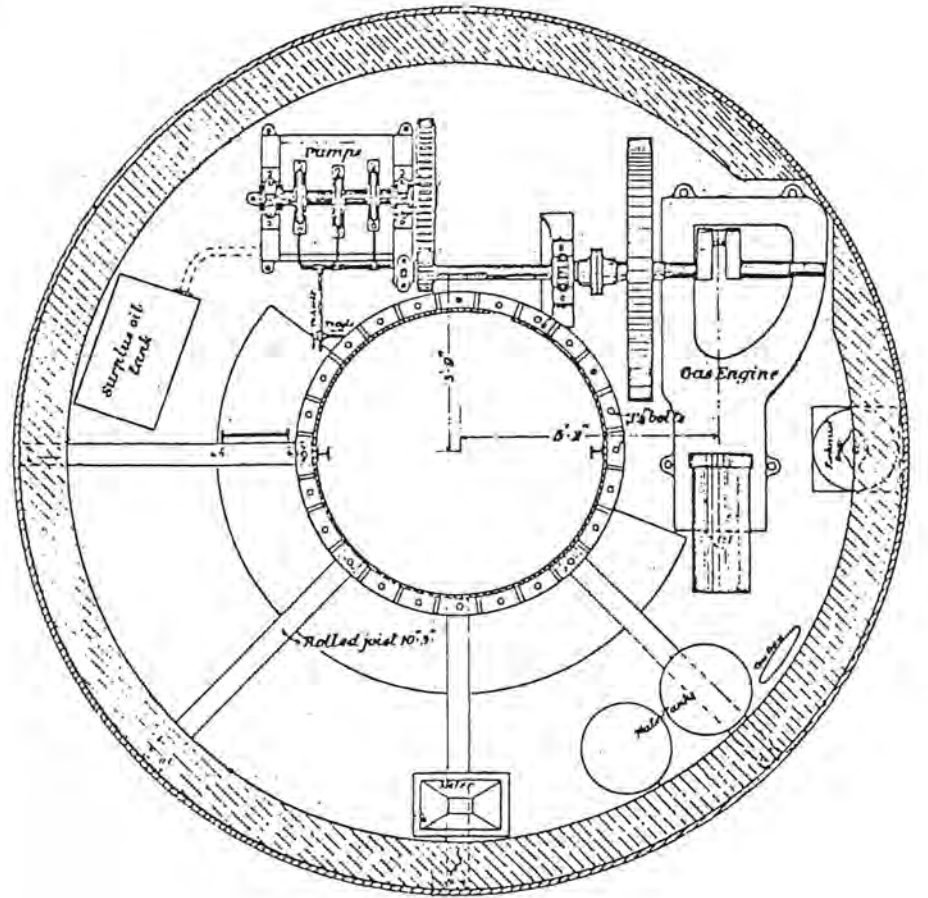


Mortice Wheel

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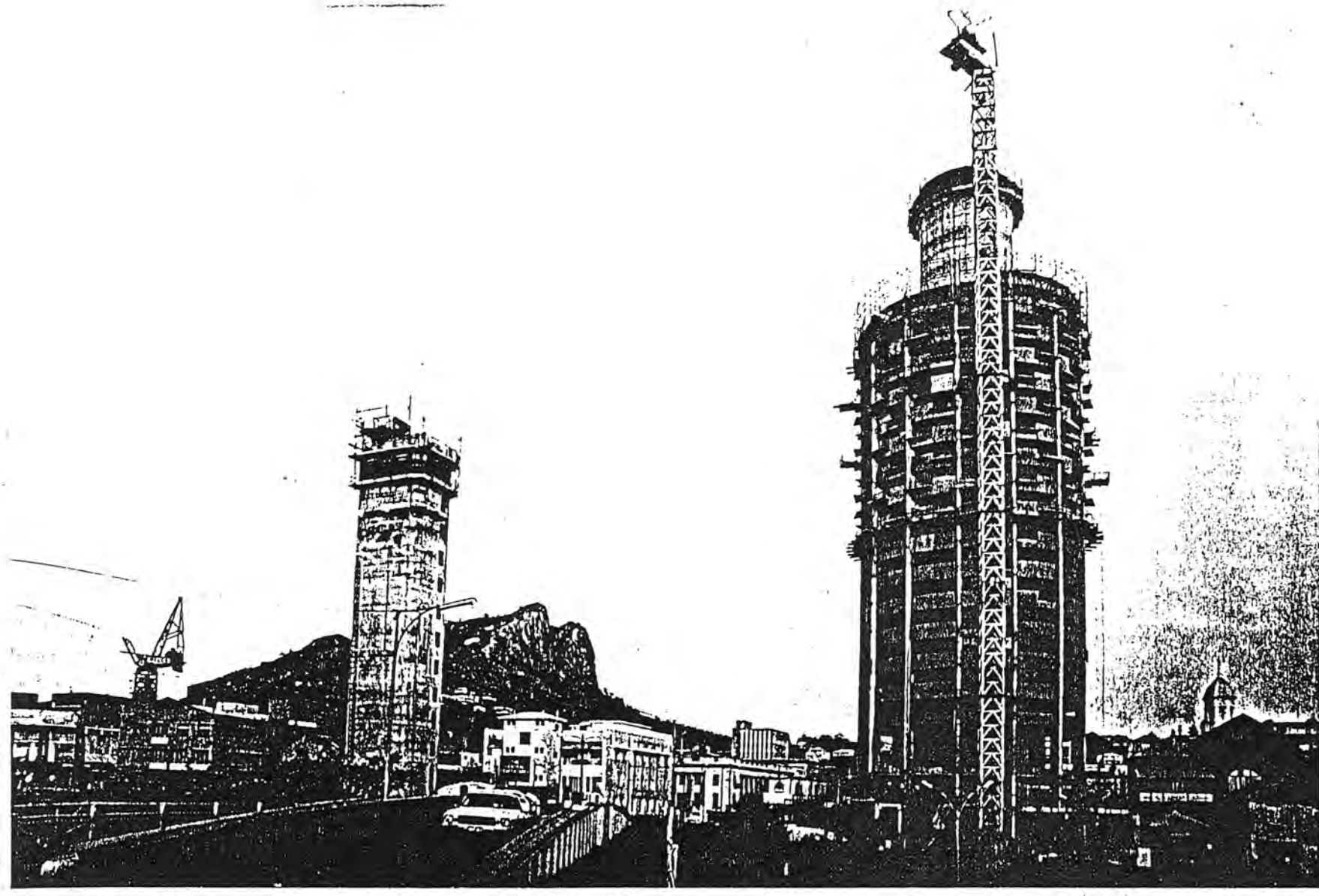


Top view of Gas Engine



Machinery Floor
Central Pier - Swing Span

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Victoria Bridge just prior to closure to vehicular traffic, 1975.

community support for the restoration of the victoria bridge

Community concern for the need to retain the Victoria Bridge has been manifest from the time of the first proposal of the Townsville City Council in 1975 that the bridge be demolished.

Public response was immediate; petitions from community groups, the teaching profession, school children, business houses, the public service, trade unions and academics were presented to the Council.

A large public meeting held in the old Council Chambers was unanimous that the bridge should be retained as it constituted a vital part of the history of Townsville. The Amalgamated Metal Workers at that meeting stated that they considered the bridge to be a unique example of bridge engineering, and that they were prepared to mobilise voluntary skilled labour to restore the bridge.

Over the intervening five years, research has revealed and made the community even more aware of the historical significance of the bridge. Participation in the Victoria Bridge Advisory Committee by representatives of decisive community organisations has given quality and depth to the work of that Committee. This has resulted in

a continuing flow of information and a steady on-going debate, with good response from the media and the public.

So far all requests for information, practical assistance and support have been willingly met. The Institution of Engineers, Australia, (Townsville Local Group), the Townsville Branch of the National Trust, the Townsville Trades & Labor Council, the Townsville Tourist Organisation, local architects and other interested individuals have been unstinting in the help given to the City Council in the preparation of this submission.

There is no doubt that the work of restoration will be followed with keen interest and enthusiasm by the Townsville community.

Appendix A

bridging ross creek — significant dates relating to the construction and operation of the victoria bridge 1875—1925

- | | | | |
|-------------|--|------------|--|
| 25.11.1875. | The Inspector-General of Roads, Fred Byerley, reported to Under-Secretary of Public Works on a proposed line of road from Townsville to Magazine Island, and recommended a site at the foot of Denham Street. Estimated cost £10,000 for bridge and roadworks. | 23.5.1877. | The Inspector-General of Roads reported to the Minister of Works on the petition submitted by the Mayor, Alderman E. A. Head, of Townsville, and other residents. He rejected their choice of sites. |
| 23.12.1876. | The Inspector-General of Roads requested authority to proceed with bridge over Ross Creek. | 18.6.1877. | The Under Secretary of Works, Edward Deighton, advised the Mayor that the Government accepted the site selected by the Inspector-General of Roads. |
| 28.4.1877. | Petition to the Secretary of Works signed by 51 residents of Townsville about the choice of a bridge site across Ross Creek, Petitioners suggested either foot of Denham Street or Stokes Street, rather than the mouth of the creek. | 11.7.1877. | John F. Walker telegraphed John Macrossan, M.L.A., Brisbane -
" Ross Creek Bridge site a mistake ... Have proceedings stopped ". |
| 17.5.1877. | Inspector of Roads reported to the Minister of Works that after consultation with the Engineer of Harbours & Rivers and the Engineer in charge of Railway Surveys, he recommended a site at the Ferry and end of Flinders Street rather than at the foot of Denham Street, as suggested in his report dated 25.11.1875. New site approved by Minister. | 12.7.1877. | The Inspector of Bridges wrote to the Minister of Public Works rejecting contents of Walker's telegram. |
| | | 17.7.1877. | The Under Secretary of Public Works, Edwards Deighton, wrote to J. M. Macrossan, M.L.A., rejecting Walker's comments. |
| | | 19.7.1877. | George Thorne wrote to "Dickson" requesting that Nisbet, Engineer of Harbours & Rivers, report on site selected by Mr. Byerley. |

- 19.7.1877. George Thorn wrote to J. Thorneloe Smith, Engineer in charge of Railway Surveys, on site selected for terminus for Townsville-Chartiers Towers Railway in connection to site of proposed bridge over Ross Creek.
- 26.7.1877, William D. Nisbet, Engineer of Harbours & Rivers, wrote to the Colonial Treasurer approving the site selected.
- 28.7.1877. J. Thorneloe Smith, Engineer in charge of Railway Surveys, wrote to Minister of Public Works supporting the site selected.
- 30.7.1877. Inspector of Bridges telegraphed Under Secretary for Public Works about construction of road from Townsville jetty to bridge site.
- 1.8.1877. Under Secretary for Public Works telegraphed F. Byerley at Rockhampton about cutting timber for Ross Creek Bridge.
- 1.8.1877. F. Byerley telegraphed Under Secretary for Public Works. Timber not yet ready. Freight from Maryborough ruinously high.
- 29.10.1877. Tenders called for construction of bridge over Ross Creek.
- 19.12.1877. Tender advertised again.
- 28.1.1878. Contract for bridge over Ross Creek awarded to W. Salmon (Govt. Gazette, page 248).
1879. First bridge completed. Built from end of Flinders Street to Ross Island opposite the Metropole Hotel on site of Lower Ferry. Constructed as a drawbridge operated by windlass at a cost of £3,000.
- 30.10.1879. The Council petitioned the Government by telegram if it was the Government's intention to complete or remove the bridge over Ross Creek.
- The costs for extending and constructing Flinders Street between Wickham Street and Ross Creek Bridge was estimated to be £588. 2s.10d.
- 3.11.1879. Edward Deighton, Under Secretary of Public Works, telegraphed the Mayor, Alderman P. F. Hanran, that it was proposed to remove bridge from Ross Creek.
1880. First bridge demolished at a cost of £600.
- 21.5.1883. Council approved the preparation of a petition to the Government requesting money be included in the estimates for 1883-1884 for the purpose of building a new bridge across Ross Creek.
- 11.6.1883. The Under Secretary of the Treasury acknowledged a petition forwarded by the Mayor, Alderman T. Willmet, for a bridge over Ross Creek. Petition sent to Minister of Works.



- 20.6.1883. The Under Secretary of the Department of Public Works & Mines advised Council that the Department no longer undertook such work (construction of bridges) and several previous applications had been refused.
- 2.7.1883. Mayor, Alderman Willmet, made representations to Mr. Macrossan to have money included in the estimates for building a bridge across Ross Creek.
- 4.10.1883. Mayor, Alderman T. Willmet, pointed out to Minister of Works during his visit to Townsville, the great need for a bridge across Ross Creek to connect Ross Island with the larger portion of the Municipality.
- 17.11.1883. Murdo Cameron (later Mayor, in 1894) requested Council permission to remove earth approaches to old bridge opposite corner of Morehead & Palmer Streets.
- 14.1.1884. On the motion of Alderman Hubert, Council resolves that the Government be requested to include £5,000 in the estimates for a bridge across Ross Creek.
- 9.2.1884. Council requested Government to place sum of £5,000 on the Estimates for a swing bridge over Ross Creek. Request approved.

- 25.2.1884. £5,000 included in Estimates for Ross Creek Bridge.
- 26.5.1884. Public meeting held on Ross Island and appointed delegation, members, Messrs. Page, Wales, Graham and Martin to wait on Premier on his visit to Townsville about immediate erection of bridge over Ross Creek.
- 28.8.1884. The Under Secretary for Department of Public Works & Mines advised the Council that the recently appointed Engineer for Bridges, Mr. J. H. Daniells has been instructed to visit Townsville to inspect site of proposed bridge.
- 2.12.1884. Proprietors of the "Ross Island Estate" South Townsville, set aside £600 from proceeds of sale towards erection of bridge across Ross Creek, opposite Morris Street. This bridge was eventually built at Bridge Street by the Thuringowa Divisional Board.
- 3.1.1885. Petition to the Under Secretary of Public Lands from 80 residents of Ross Island, Flinders Street and its vicinity requesting construction of a bridge across Ross Creek on the line of Knapp Street and a road through Water Reserve (Ross Island). They were prepared to contribute £500 to the costs of these works.

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- 16.1.1885. The Under Secretary of Public Works and Mines forwarded to the Council a tracing showing two bridge sites, at Stokes Street & Blackwood Street. Advised Council that the Engineer for Bridges, Mr. Daniells, favoured the Blackwood Street site. The Department further advised Council that it did not propose building a swing bridge at either site as it is proposed to extend the railway to the jetty.
- 27.1.1885. Hubert Goldstein, on behalf of purchasers of allotments in the "South Townsville" estate, informed the Under Secretary of Public Works that the purchasers were prepared to contribute £1 per allotment in addition to the £500 already offered.
- 7.2.1885. Under Secretary of Public Lands requested Council's comments on petitions.
- 19.2.1885. Under Secretary of Public Works advised Council that the Engineer for Bridges, J. H. Daniells, instructed to prepare plans for Bridge.
- 20.2.1885. Under Secretary of Public Works telegraphed Council advising that the Engineer for Bridges had been instructed to prepare plans for swing bridge immediately, so that tenders could be called.
- 20.2.1885. Under Secretary for Public Works & Mines advised Council that it was proposed to erect bridge at foot of Stokes Street.
- 5.6.1885. Under Secretary for Public Works & Mines advised Council would call tenders for bridge in about five months time.
- 10.7.1885. Tender called for an Iron Swing Bridge over Ross Creek.
- 8.10.1885. Contract for construction of bridge awarded to G. H. Royce for £18,091. (Supply of Materials £9,223, construction £8,868.)
- 8.2.1887. Contractor commenced pile driving. Line of piles crossed ferry stage near ferry house, which was required to be removed.
- 11.5.1887. Sketch plan sent to Council showing position of bridge and upper ferry landing at Stokes Street.
- 25.7.1887. The Superintendent of Bridges forwarded plans to Council showing position of bridge in relation to Stokes & Palmer Streets.
- 8.8.1887. Contractor enquired what Council's price would be to supply, at Stokes Street, 300 cubic yards of 2½ inch metal and about 230 cubic yards of screenings.

- 9.8.1887. G. H. Royce & Co. (London Office, 33 Old Broad Street) offered Council to construct Flinders Street approach to bridge for £2,850. In regard to the Ross Island approach from the junction of Palmer and Dean Streets, the contractor could make no offer until the views of the Corporation were known - the height of bridge deck at this point above ground level being 16 feet. Width of bridge 30 feet.
- 19.8.1887. Contractor accepted Council's offer to supply 2½ inch metal at 7/- per yard and screenings at 4/- per yard. Deliveries to commence Monday, 22nd August.
- 21.9.1887. The Under Secretary of Public Works and Mines advised Council that the Government would only be responsible for construction of bridge. The approaches would have to be financed by the Corporation.
- 3.10.1887. Council petitioned by ratepayers to commence work on bridge approaches.
- 28.12.1887. G. H. Royce & Co. complained about water rated (89,000 gallons in 3 months). Claimed that consumption was for running a 7 horsepower engine and for drinking by 25 men,
- 11.1.1888. J. Gordon queried whether the Council intended to close Little Flinders Street (now Ogden Street) by constructing an earth embankment as an approach to the bridge.
- 16.1.1888. Antonio Glover also requested that Flinders Lane (same road) remain open for traffic.
- 19.1.1888. Robertson & Stein advised that the ferry stage at Ross Island and some water pipes are on the line of the approach earthworks.
- 30.4.1888. Subsidence of embankment of the approach to the Ross Island side of the Bridge. Ferry stage to be shifted.
- 1.5.1888. Mr. Daniells, Engineer for Bridges, instructed Robertson & Stein of Royce's staff, Stein was foreman in charge, to remove the ferry stage on Ross Island side.
- 1.5.1888. Robertson & Stein sought permission from Council to remove material from the west end of Will Street. All excavation to be done to levels set by Will Dwyer, City Engineer, at a price of 1/- per cubic yard.
- 22.5.1888. Under Secretary for Works informed the Council that the Government would restrict work on the Ross Island approach to either Palmer or Dean Streets which ever the Engineer considered best.
- 22.5.1888. Under Secretary for Works advised the Council that connections to Flinders Lane were the Council's responsibility.

2.7.1888. A. B. Oldenberg requested that a deputation from the Council wait on the Minister for Works to request that an approach from Dean Street to the bridge be made.

12.7.1888. Under Secretary of Works advised the Council that approaches to Flinders Lane from the Ross Creek Bridge were the Council's responsibility.

12.7.1888. Under Secretary of Works issued instructions to construct the approach from the bridge to Dean Street.

31.8.1888. Government Resident Engineer James Laurie requested Council to: -
 (i) on Ross Island side - shift ferry stage and water valves otherwise they would be covered.
 (ii) on town side - lengthen the existing brick drain otherwise it would be blocked.

The Government had apparently agreed to construct the approaches on both sides.

12.10.1888. James Laurie, Resident Government Engineer, advised A. G. Bundock, Mayor, that the contractor for the Dean Street approach, James Enright, had commenced work that morning and the ferry stage would be stopped unless shifted.

Also the drain from Flinders Street should

be carried down immediately to join the existing two foot diameter drain through the half-formed approaches as piling was to commence.

13.12.1888. Council spend £30 on the approach from Palmer Street.

8.1.1889. Michael Byrne, contractor, tendered to construct a 15 foot wide road on the eastern side of Stokes Street from Flinders Street to low water mark under the bridge, for £87 10s 0d.

5.1.1889. James Laurie, Resident Bridge Engineer, requested the Mayor, Alderman J. N. Parkes, to complete Council's works in Stokes Street.

29.5.1889. John Morris, lessee of Upper ferry, requested reduction in rent payable because people had been able to walk across bridge for the last two weeks. Claimed his losses were between 10/- and 15/- each day. Suggested that Mr. Royce enforce a toll on the bridge.

6.6.1889. The Council's Works Committee approved a reduction in rent from 29th May. This was rejected by Morris, who requested the cancellation of his lease.

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- 10.6.1889. Alfred Clegg, lessee of Lower ferry complained of the large number of people using the bridge although the official opening was not due for six weeks. The drop in ferry passengers was particularly marked as this was "Encampment" week and passenger numbers were usually higher during this period.
- 12.6.1889. William Martin complained to the City Surveyor, Will Dwyer, about the disgraceful state of the Dean Street approaches.
- 21.6.1889. John A. Stein offered his services to Council to operate the Ross Creek Bridge mechanism. Enclosed with his application, a reference from G. H. Royce.
- 27.6.1889. David Thorn requested Council to allow him to operate Lower ferry seeing bridge would be opened in a few days.
- 28.6.1889. Will Dwyer, City Surveyor and Engineer, recommended that before "taking over" the bridge, the Council should request Mr. Stein to provide a list of tools and plant needed to operate the Victoria Bridge swing (first use of Victoria as name).
- Also suggested he needed a set of working plans showing sections and elevations.
- 1.7.1889. Bridge handed over to Corporation,
- 2.7.1889. Officially opened by Mayor, Alderman J. N. Parkes.
- 3.7.1889. John Kelly applied to J. N. Parkes, Mayor, for "Caretaking, Lighting Opening and Closing Swing of Victoria Bridge".
- 8.7.1889. Burns Philp & Co. Ltd. requested that the bridge be opened at 5.00 p.m. to allow the Company's launch to tow out the schooner "Three Cheers".
- 8.7.1889. Mr. Hughes, officer in charge Customs, advised Council that Mr. Royce had lamps at Ross Creek and that his Department had not done the work.
- 11.7.1889. Burns Philp & Co. Ltd. requested bridge to be opened tomorrow, Friday, morning to allow two of its lighters to go upstream.
- 30.7.1889. John A. Stein again applied for position of Caretaker of Victoria Bridge at a salary of £165 per annum.
- 15.8.1889. John Stein appointed engineer at salary of £165 per year.
- 20.8.1889. The City Surveyor, Will Dwyer, enquire from M. J. Thomsen, timber merchant, whether the Council could locate the office of Mr. Stein alongside Mr. Thomsen's workshop.

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- 21.8.1889. Mr. Thomsen agreed.
Estimated cost of office, £19. 5s. 0d.
- 12.9.1889. Council purchased goods to a value of £112 10s 4d. at sale of Royce's surplus plant and goods.
- 16.10.1889. Joseph Vidulich, ship, wharf and bridge builder and repairer, informed Council that the screw jack borrowed by the Bridge Caretaker was returned partly broken and requested it be replaced. Estimated cost 25/- to 30/-.
- 19.10.1889. Burns Philp & Co. Ltd's steamer "Dairy-maid" and lighter "Samson" detained upstream as swing unable to open (caused by broken bolt). After unshipping mast of lighter it was passed under bridge but steamer was detained until bridge repaired.
- 23.10.1889. The Town Solicitor, Edwin Morris, gave his opinion that the Council was liable for compensation.

He added that if parts of bridge were defective as many claimed, then Council could expect large number of claims.
- 24.10.1889. Burns Philp & Co. Ltd. claimed £15 compensation for detention of its steamer "Dairymaid" from 18th to 21st October. Steamer prevented from going to Barratta Creek and returning with 75 tons of sugar - freight being £30. Hire of steamer £10 per day, therefore in the opinion of the claimant £15 was reasonable for 3 days detention.
- 4.11.1889. Council paid £15. 0s 0d. in full payment of Burns Philp & Co. Ltd's claim for detention.
- 6.11.1889. Smalley & Burns reported to the Mayor, that "the repairs executed by us last month were as follows: -
a radial bolt having broken in the screwed part, and not having room enough to get out broken parts we found it necessary to cut the bolt and had to put in new bolt in two pieces, coupled together with a gun metal nut screwed for right and left hand thread.

(The radial bolts are used for keeping the rollers in their proper position on roller path.)

With regard to prevention of similar accidents in future: -
As three bolts have broken to date, and each bolt has broken in same place, viz the bottom of thread it is clear to us that the bolts are too weak for their work. The bolts are badly designed as the body of the bolt for 5 feet is 2.5" in diameter being then reduced to suit a 2" nut, leaving the bottom of thread 1.71" in diameter, the bottom of thread thus being more than 50% weaker than body of bolt.

We think that it is necessary (to be safe) to make new bolts, boring out the central casting to allow a 2½" screw instead of 2" one as at present and reducing the body of the bolt from 2½" to 2.3/16". "

11.11.1889. Joseph Vidulich claimed £5 for detention of punt, Delta, for one day and for labour incurred in dismasting and remasting punt. Bridge closed 19th and 20th October.

23.11.1889. Smalley & Burns reported further as follows: -

"Roller Wheels

We find that when bridge is swinging, three of the rollers rub hard on side of Hydraulic Cylinder Casing; the side of this casing will require to be chipped to give clearance for rollers to pass. A lubricator ought to be fixed to each roller to keep the bearings always oiled.

Locking Slides

The four locking slides at ends of swing require provision made for lubrication and their faces well guttered to lead the oil over the faces.

Hydraulic Pumps

The Suction Pipes on Hydraulic Pumps in tank require brass roses fitted on each to prevent any particle of dirt passing to the valves, as the smallest particle will stop the pumps from working.

Manhole on Bridge

The manhole door in floor of bridge giving access to interior of cylinder, needs an arrangement for fixing door open; at present it is dangerous when a man is going down or coming up. A sliding iron tray under this door would be a great advantage to catch the rainwater and dirt washed down through joints of door and so protect the machinery below.

We recommend that the cost of doing the above alteration, viz: taking out present bolts, replacing with new, supplying and fixing lubrication on wheel rollers, chipping cylinder casing and lubricating the four lock slides, at about £130."

29.11.1889. John Stein requested an assistant due to increase in River traffic through bridge. He added machinery seems designed in such a way as to make repairs almost impossible in time available.

6.12.1889. Joseph Vidulich provided Council with details of his claim of £5 for detention of punt, Delta.

27.12.1889. Burns Philp & Coy. Ltd. claimed £35 for loss, freight, commission lighterage and towage on Bullocks short shipped because no one in attendance to open bridge.

27.12.1889. Burns Philp & Coy. Ltd. claim £5 demurrage on lighter "Samson" loaded with coal for Railway but unable to pass up Creek as bridge could not be opened. Proposed to claim £5 for each day the lighter could not pass bridge. The failure of bridge was caused by a radial bolt breaking.

- 30.12.1889. Another radial bolt broke - total claim £20 as lighter "Samson" delayed from 27th to 30th December.
- Acting Under Secretary of Works telegraphed Mayor -
- " Bridge Engineer leaves for Townsville per "Bulimba" tomorrow ".
- 31.12.1889. Acting Under Secretary, Works, confirmed that Mr. Brady, Engineer for Bridges, leaves for Townsville tonight.
- " Government accepts no responsibility in the matter as Minister considers there may not be sufficient engineering talent in Townsville to deal with the matter.
- Mr. Brady's expenses to be charged to the Municipality. "
- 14.1.1890. Burns Philp & Co, Ltd. claim £5 demurrage for lighter "Samson"
- 17.1.1890. M. J. Thomsen informed Mayor of abusive behaviour of Caretaker, Mr. Stein, when told he could not borrow Mr. Royce's crab winch left in Mr. Thomsen's care.
- 17.1.1890. John Stein commented on Burns Philp & Coy. Ltd's claim for £35, his onerous duties and failure of shipowners to give sufficient notice of intention to pass vessels through bridge.
- 22.1.1890. John Stein advised City Surveyor, Will Dwyer, that to complete their repairs, Smalley & Burns required the bridge to be open from midnight till 6.00 a.m. Requested advertisement placed in newspaper prohibiting all wheel and foot traffic during this period.
- 23.1.1890. Unsigned report prepared by John Stein on repairs to bridge as follows: -
- " I herewith beg to report what in my opinion actually wants to be done to Victoria Bridge before it will be in thorough working order -
1. The holes in radial centre wheel want enlarging to allow of stronger bolts passing through it.
 2. The 16 radial bolts want stronger end where passing through radial wheel.
 3. Proper provision wants to be made for lubricating conical rollers and bolt heads.
 4. Proper provision wants to be made for lubricating chain wheels in opening and closing pistons.
 5. Proper provision wants to be made for lubricating of fixed chain wheels.
 6. Lubricating cups wanted for slides of opening and closing pistons.
 7. Closing piston wants to be protected from dust.
 8. Set screw pins wanted in cast iron supporting brackets of opening and closing pistons.

9. Ring bolts wanted in brackets for slinging when replacing piston leathers.
10. Longer slides wanted to allow of quick replacement of leathers.
11. A Rose wanted on each suction of hydraulic pumps to prevent stoppage of pump through dirt.
12. Delivery pipes of pumps want to be cut and flanges put in to allow of replacing pump leathers.
13. Pipes over pivot want cutting and union put in to allow of replacing of pivot leathers.
14. Opening chain wants cutting and shackle put in to allow further adjusting.
15. Manhole door protected from dust and rain.
16. Cast iron pipe bend wanted on exhaust of engine to prevent it from king tides and flood water.

I think if all the above named items were done that I could keep bridge working without a hitch from years eve to years end, with the assistance of four men for a few hours, when replacing main piston leathers; these, of which there are three in number, will want replacing twice each year, and will take about four

hours each time, granted I have the following gear in readiness, viz:

1 Double purchase crab winch, thirty feet of best two inch steel wire rope, one 3/4" chain sling, and two 1-1/8" iron shackles. "

The Engineer for Bridges, Mr. Brady, also reported on the operations of the bridge about this time.

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| 30.1.1890. | Vidulich's claim for demurrage on punt "Delta" £5 paid. |
| 27.2.1890. | Under Secretary of Works enquiring from Railway Department whether locomotive foreman available for repair work on bridge. |
| 4.3.1890. | G. Baillie as agent for P. G. Brown claimed £9 for detention of ketch "Whaup" because of failure of swing section of bridge to open. |
| 21.3.1890. | Under Secretary of Works informed Council that Railways would carry out repairs - estimated cost £60. |
| 28.3.1890. | Claim of £20 for detention of S.S. "Kingswear" for 24 hours made. |

Townsville Gas & Coke Coy. Ltd. informed Town Clerk that the Company's works were flooded on Monday night last and retorts drenched. Unlikely to be able to supply gas to operate bridge engine for at least another thirty hours.

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- 1.4.1890. John Stein requested that Mr. Brady's and his own recommendation to put bridge in working order be implemented immediately as bridge would not work long in its present state. Two large steamers were regularly bringing coal to Railway Wharf and these could be detained.
- 2.4.1890. The Town Solicitor, Edwin Norris, informed Council that he would require full details of the contract with the Gas Coy. before he could express an opinion on whether the Council could claim compensation because of the Company's failure to supply gas.
- 3.4.1890. Cost of repairs to swing of bridge paid, £60.
- 9.4.1890. Under Secretary Works telegraphed Railways and requested Department to instruct foreman to put repairs in hand at once.
- 10.4.1890. John Stein reported further damage to swing - could be worked manually but required assistance of man when opening or shutting swing.
- 14.4.1890. G. A. Roberts & Leu claimed £70 on behalf of Burns Philp & Co. Ltd.
- 17.4.1890. M. J. Thomsen sought permission to put a wicker gate in first panel of bridge and gangway to his residence.
- 1.5.1890. Burns Philp & Coy. Ltd. issued a writ, No. 126 of 1890, for £100 damages against Council for demurrage claims unpaid.
- 2(?) .5.1890. Notice placed in local press stating that twelve hours prior notice required to have bridge opened.
- 12.5.1890. Burns Philp & Coy. Ltd. queried whether this was to be a permanent requirement.
- 21.5.1890. Burns Philp & Coy. Ltd. lodged statement of claim: -
- | | |
|---------------------------|-------------|
| Lighter detained | 26.12.1889. |
| Lighter "Samson" detained | 26.12.1889. |
| Lighter detained | 9.1.1890. |
- Edwin Norris withdrew his advice to Council to defend case on being informed by John Stein that Council were aware that the swing would not work unless remedial work carried out.
- 27.5.1890. Burns Philp & Coy. Ltd. accepted £70 in full payment of its claim.
- 28.5.1890. G. Baillie threatened court proceedings if his claim for detention of the ketch "Whaup" not paid.
- 3.6.1890. Burns Philp & Coy. Ltd. claimed £5 for detention of lighter "Norseman" from 5.00 p.m. Monday, 2nd June to 6.00 p.m. Tuesday, 3rd June, although written notice had been given to open swing.
- 6.6.1890. John Stein resigned giving one month's notice.

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- 7.6.1890. Howard Smith & Sons Ltd. claimed £4 on behalf of Wright Heaton & Coy. The lighter "Nebo" carrying 50 tons coal to the Railway Wharf detained.
- Wright Heaton charged demurrage by Railway for 8 trucks.
- 30.6.1890. William Norris appointed Caretaker at £165 per annum.
- 3.7.1890. Council spent £10 on tarring girders of bridge.
- 28.7.1890. "Kingswear" detained. Six men required to manually open swing. Captain J. Farmer claimed damages for detention.
- 31.7.1890. Council paid the following claims for demurrage: -
- | | |
|------------|--------|
| "Whaup" | £9/-/- |
| "Norseman" | £5/-/- |
| "Nebo" | £4/-/- |
- 1.8.1890. Under Secretary of Works forwarded voucher of £84. 6s. 10d. being for cost of repairs carried out by Railway Department.
- 6.8.1890. Martin Julius Thomsen offered to operate bridge for the Council for 12 months for £350 whilst paying all costs of operation and demurrage claims.
- 28.8.1890. "Kingswear" detained 12 hours. The Master claimed £10.
- Council paid Captain Farmer £10 and the cost of a Supreme Court writ £4.14.6d.
- 29.8.1890. Council complained to Townsville Gas & Coke Coy. Ltd. about the inadequate gas supply available to operate bridge's hydraulic gear. The Gas Company replied that the problem was caused by accumulated water in the bridge's fittings.
- 4.9.1890. Demurrage claim "Kingswear" £20 paid.
- 10.9.1890.)
20.9.1890.) Tenders called to operate bridge.
- 25.9.1890. M. J. Thomsen's tender to operate swing at £33. 6s. 8d. per month accepted, but tender was dated 1st October.
- 8.12.1890. District Locomotive Superintendent declined to prepare specification and estimate for the scraping and painting of Victoria Bridge.
- December,
1890. Deputation waited on Premier whilst he was in Townsville requesting that the Government pay the amount expended (£1,039.6.10d.) on the bridge to date for repairs, maintenance and demurrage claims.
- 27.1.1891. Under Secretary of Public Works advised that Government would make no further contribution towards maintenance or repairs to bridge.
- 23.4.1891. Council paid £20. 16s. 7d., the legal costs of Burns Philp & Coy. Ltd. for a writ claiming demurrage.

- 11.6.1891. John Stein, first Caretaker, left Townsville.
- 4.7.1891. Railway Commission agrees to allow Locomotive Superintendent, Townsville, Mr. King, to periodically examine and superintend the bridge machinery.
- 10.8.1891. Mr. King inspected bridge and reported to Council.
- 20.8.1891. M. J. Thomsen offered to renew his contract for twelve months.
- 23.10.1891. Thomsen's contract extended for 1 year.
- 19.11.1891. Tenders called for cleaning, scraping and painting bridge.
- 18.12.1891. Henry J. Tilley offered to prepare specifications and superintend the work at the usual percentage.
- 14.1.1892. Tunbridge & Tunbridge willing to undertake supervision at usual fee 5% per £500 or more.
- 10.2.1892. Tunbridge & Tunbridge to proceed with work at once.
- 18.2.1892. Tunbridge & Tunbridge forwarded specifications of works to Council, estimated to cost £205.
- 25.2.1892. Tunbridge & Tunbridge called tenders for work.
- 16.3.1892. Lowest tender of £377 submitted by R. Neelssen, Coachpainter of Nelson Street, South Townsville.
- 13.9.1892. Tenders called for the working and managing of bridge. Bond of £400 required from successful tenderer.
- 22.9.1892. Prospective tenderers requested reduction in the amount of bond required. (£400)
- 6.10.1892. Management contract awarded to Gustave Hansen.
- 13.10.1892. Hansen requested that bridge be placed in proper working order before he would take it over.
- 27.10.1892. Main cylinder painted for £25.
- 30.10.1892. Schooner "Roderick John" carried away the Bridge's green lamp.
- 20.12.1892. Council's Foreman of Works, Pat Ahern, reported that the scraping and painting of main cylinder and two main girders of swing completed at a cost of £30.
- 1.2.1893. Contractor Gustave Hansen requested reimbursement of £4. 11s. 6d. for replacing wire ropes snapped during the great heat of 19th January. The swing would not open because of expansion of the girders whilst the "Chatham" was coming down.
- 6.2.1893. "Ada Dent" ran into south western dolphin knocking it askew.

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- 22.2.1893. Contractor reported on poor state of bridge roadway.
- 23.2.1893. Council voted to repair roadway. Costs to be shared by South, East and West equally. Council declined to recoup Mr. Hansen's expenses due to expansion of girders.
- 8.6.1893. Mr. Hughes, Customs Officer, complained of delays in opening bridge and failure to light dolphin lamps.
- 17.6.1893. Caretaker replied saying no delay in opening bridge; could not light lamps as punt stolen, but moonlight night anyway. Captain of "Eclipse" would bear him out.
- 6.10.1893. Gustave Hansen's tender for management of bridge accepted.
- 24.1.1894. Welch & Company requested permission to erect sign on bridge advertising "Yankee Doodle" Tobacco.
- 31.1.1894. Request refused.
- 26.4.1894. "Ada Dent" whilst towing the lighter "Caniapa" through the bridge hit downstream dolphin. Vehicular and foot traffic delayed from 8.00 a.m. to 8.3.0 a.m.
- 22.5.1894. Burns Philp & Coy. Ltd. issued instructions that in future all Company's lighters would be towed bow first.
- 20.7.1894. Inspector of Police stated that Police were unable to take action against youths congregating on bridge approaches.
- 3.8.1894. Aplin Brown & Coy's S.S. "Elnathan", towing down the lighter "Moonta", hit the upstream town side dolphin then sheared over to the outer edge of the Ross Island approach, causing the "Moonta" to foul the same, carrying away two stanchions, also hand rails and stays, half gate and lamp-post attached, delaying foot and vehicle traffic for half an hour.
- 6.9.1894. Council decided to work bridge for one year by day labour.
- 6.10.1894. Placards posted on bridge by unknown person(s). Mayor ordered that the bills be removed.
- 11.10.1894. Regulations for operating bridge prepared and sent to Marine Board for approach.
- 15.10.1894. F. W. Dawson, District Locomotive Superintendent, advised that he was not prepared to inspect bridge or supervise work.
- 22.10.1894. W. B. Dick, Engineer, reported on state of machinery as follows: -
- " On Victoria Bridge Swing Gear
- At the request of the Mayor of Townsville I have this day, the 20th October, 1894, surveyed the Victoria Bridge Swing Gear.
- Gas Engine: I saw a turn taken out of the engine by hand. The parties in charge

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- (G. Hansen) could not get a turn out of the engine by gas power.
- Hydraulic Pumps: The pump rod's cross-head guide was broken in three places, and had been patched with bolts and plates, one part being completely broken through.
- Hydraulic Pipes: These pipes are very much corroded and eaten - by rust. They should have been kept clean and painted with Oxide paint - to prevent rust.
- Hydraulic Starting Gear: This part is set fast with rust and dirt and could not be moved.
- Neglect; The gear has been badly looked after. More especially, the pipe connections and rams. "
- 20.10.1894. Hansen's contract terminated at midnight. The Acting Town Solicitor, Charles S. Norris, son of Edwin Norris, wrote to the contractor and his two bondsmen, holding them responsible for restoring machinery under bond of £400.
- 25.10.1894. Council required contractor and his bondsmen to put machinery in good substantial repair.
- Contractor - Gustave Hansen
Bondsmen - Archibald McIntyre (Baker)
- Henry James Abbot (Furniture Dealer)
- 7.11.1894. W. B. Dick estimated repairs would cost about £75. 0. 0d.
- 13.11.1894. Bondsmen replied "that machinery was defective when Hansen entered into contract, he had never used it, operated the swing always by hand, and since the termination of his contract the bridge had always been opened manually, this being both the cheapest and simplest method. "
- 15.11.1894. I.J.D. Halcrow, Caretaker of Bridge, complained to Pat Ahern, Foreman of Works, about the abusive interference by Alderman McIntyre in the opening and closing of the bridge on two occasions.
- Mr. A. McIntyre (one of Hansen's bondsmen) instructed Brand & Drybrough to get machinery working.
- 20.11.1894. The Acting Town Solicitor advised Council that Hansen had withdrawn his writ.
- 19.12.1894. Regulations operation Victoria Bridge gazetted.
- 18.1.1895. Brand & Drybrough completed repairs to bridge and requested a day and time to test the swing.
- 29.1.1895. W. B. Dick, Engineer, reported on bridge as follows: -
- " Swing Gear Machinery:
- On the 23rd instant, I examined the gas engine; hydraulic pumps; accumulator; swing rams; locking shoes, and found all the above mentioned parts with pipe connections in poor working order.

Locking Shoes: I found one of the shoe blocks with a lugg broken off. And six bolts for fastening the locking blocks onto the girder were amissing. I recommended that a wrought iron lugg should be fitted and dovetailed into the block. And six new bolts fitted to the block.

Swinging: I saw the bridge opened and closed twice with the hydraulic machinery. The machinery worked without a hitch, and very satisfactory.

Spare Gear: The spare gear was all there according to the list.

Today: I examined the locking shoes, and found the block had been repaired and new bolts fitted. All the machinery connected with the Victoria Bridge is now in good order and can be taken over by you. "

- 28.2.1895. Hansen's bondsmen, Abbott & McIntyre, wrote to the Council stating that they should not have to bear all the costs (£72. 19s. 3d.) of repairing bridge.
- 18.7.1895. Council voted to keep 2 men constantly and regularly employed on bridge.
- 15.8.1895. Captain William Williamson required to make good damage done to dolphin.
- 22.10.1895. Town Solicitor advised Council to have damage repaired, then sue the owner of the vessel claiming actual cost of repairs,

- 12.11.1895. Tenders called for repair of dolphin.
- No date - 1896. Note from City Engineer. 10 men employed repairing Victoria Bridge.
- 15.2.1896. The Foreman of Works reported that during the late Cyclone "Sigma" and flood, two columns on Ross Island side of swing dropped 4 feet.
- 18.2.1896. Aldermen authorised urgent repairs to bridge.
- 20.2.1896. Mayor's action in authorising repairs confirmed by Council. Minister of Works request to pay for repairs.
- 24.2.1896. N. G. Bell, Railways District Engineer, forwarded to Council details of the Chief Engineer for Railways, Mr. Stanley's method to raise the two spans of Victoria Bridge.
- 4.3.1896. The Under Secretary of Public Works advised Council that on receipt of estimate the Government would consider the question of paying for repairs from general revenue.
- 16.4.1896. Council sent Minister of Works details of the costs of repairs £1,200.
- 14.5.1896. Minister requested to pay cost of repairs.
- 26.5.1896. The Under Secretary of Public Works advised the Council that the Department cannot accept liability for Works which have been handed over to the Municipality.

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- 2.7.1896. Council requested Messrs. Philp & Castling (Members of Parliament) to urge the Government to pay costs of repairs,
- 21.10.1896. I.J.D. Halcrow, Caretaker of the Bridge, in supporting a claim for a wage of 8/- per day, 7 days a week, stated that in the last two years, the swing had been opened 1,100 times and 1,555 vessels had passed through.
- 3.11.1896. Dr. Hunter Finley complained of obstruction on the town approach to the bridge caused by loading and unloading of drays at Rooney & Company's shop.
- 12.11.1896. Council decided to pay Caretaker 8/- per day, 7 days a week, with no overtime and his assistant 8/- per day, six days a week with overtime where necessary.
- 4.12.1896. The former Engineer of Bridges, Mr. J. H. Daniells, now in private practice in Townsville as a Civil Engineer and Architect, wrote to the Mayor as follows: -

" I trust you will pardon me writing to you concerning the Victoria Bridge, Townsville, the reason being that certain erroneous impressions exist with regard to the sinking or subsiding of some of the screw piles on the Ross Island side of Creek. These impressions I desire to remove, as they have proved and are now proving most detrimental to me as a Professional man trying to gain my living in Townsville.

That I am in no way to blame for the injury to the Bridge the following will prove.

The Bridge was certainly designed by me when Engineer for Bridges, built by contract by a contractor who had built many of my Bridges and under the supervision of my resident Inspector.

The screw piles were duly sunk and dead weight tested in terms of the specifications and reported on as satisfactory. The test weight of 20 tons placed on each cylinder, near water level, remaining on four days; after removal of which the cylinders were concreted.

I must now point out that screw piles are used under certain conditions, viz: where solid foundations such as rock, hard clay or gravel can not be got except at great depths, involving corresponding increase of cash.

By way of comparison, I may state as one instance out of many. The case of one of my bridges over Parramatta River, New South Wales, where the bridge to carry railway and road traffic (4'-8½" gauge) with 26 feet roadway, distance centre to centre of tiers 127'-0" and 4'-6" cylinders, the test load was 50 tons.

In the case of the Townsville Bridge, we have only ordinary traffic, 40 feet and 20 ton test

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load, some months after I left the service an excessive load of 120 tons was placed over one of the screw pile piers, to this weight of road metal must be added, the weight of the superstructure, the 120 tons of road metal allowed to remain and the bridge more than 4 hours, by whose instructions or for what purpose it is difficult to understand, suffice to say that the Bridge suffered through overloading and I am now being made to suffer through some one else's act, after I had left the Government service.

I trust, Mr. Mayor, that you and the other members of the Town Council, as well as the public generally will understand that I am in no way responsible for the injury done to the Bridge by settlement or sinkage and that I should no longer be made to suffer therefrom. "

- 22.2.1897, Immediate repairs to dolphin authorised,
- 11.10.1897. Under Secretary of Public Works informed the Council again that his Department would not accept the liability for the cost of repairs to works which had been handed over to the Municipality,
- 7.12.1897. J. D. Halcrow tendered his resignation as Caretaker after 3 $\frac{1}{4}$ years - leaving the colony,
- 10.1.1898. 29 applicants for position of Caretaker; R. Doyle, former Assistant Caretaker, appointed after exhaustive vote with F. W. Stuart as Assistant.
- 7.6.1898. Foreman of Works, Mr. P. Ahern, recommended repairs to decking at an estimated cost £80.
- 8.6.1898. Under Secretary for Public Works requested Council to pay £19. 4. 4d., the cost of borings carried out by Railway Department in connection with examination of bridge. Request repeated on 23rd August and account paid by Council on 6th September.
- 22.9.1898. Council authorised repairs to decking, £80, and to approaches, £42.
- 9.12.1898. Gas Company allowed to take gas main across to Ross Island under the bridge provided the pipe was submerged.
- 28.2.1899. Foreman of Works reported that wire netting on handrails needed replacing - estimated cost £10.
- 16.6.1899. A. G. Unmack, Town Solicitor, gave his opinion that the bridge was under the control of the Council and had not been vested in the Harbour Board by the Townsville Harbour Board Act of 1895 and the Amendment Act of 1897 as suggested by the Council.
- 10.7.1899. The S.S. "Wakefield" owned by the Adelaide Steamship Coy. Ltd. given "channel clear" signal at 9.25 p.m. but when going through the bridge found the Schooner "Mary Peverley" lying across the channel but was able to avoid a collision. The Caretaker explained that the channel was clear but the "Mary Peverley" which was secured by a line to the upstream

- dolphin then swung across the channel. He immediately jumped on the dolphin and shouted to the Master of the "Wakefield" to go astern thereby averting a collision.
- 8.8.1899. The Masters of twenty-three vessels petitioned the Council not to renew the downstream dolphin but to continue using the floating light, which had been placed in the position of the dolphin as a temporary measure when dolphin destroyed.
- 12.9.1899. Council approved the asphaltting of paths on both sides of bridge - cost £30.
- 5.1.1900. Caretaker complained that the Master of the S.S. "Gollan" requested swing to be opened at 8.30 p.m. but kept postponing time until 4.45 a.m. next morning when tide too low to allow ship through.
- 6.1.1900. "Canaipa" damaged one of the caps on the downstream dolphin.
- 27.2.1900. S.S. "Naiad" damaged in collision. Council paid £8. 9. 4d. compensation. Caretaker warned that he would be held responsible for future similar accidents.
- 18.10.1900. G. H. Royce (now Engineer, Harbour Board) agreed to inspect bridge for Council.
- 19.2.1901. Gas main under bridge broken when punt which was moored to bridge settled on pipe as tide ebbed. Gas Company provided oil to affected street lamps on Ross Island at its expense. Council rejected Company's complaint.
- 9.3.1901. Gas Company, in reply, said that "the rudder of the punt was jammed against the syphon and one pipe was broken in two and several of the joints were strained."
- 10.9.1901. Road to be asphalted at a cost not to exceed £50.
- 20.1.1903. Newly elected Council resolved to take action to ensure safety of this important thoroughfare.
- 31.3.1903. Tenders called for opening, closing and upkeep of bridge.
- 7.7.1903. Robert McIntyre's tender accepted.
- 1.3.1904. Dolphin to be removed.
- 7.7.1906. Hoare & Moyses tender to operate bridge for 12 months at £249 accepted.
- 9.7.1907. Repairs to decking £78 and approaches £143. No further contracts to be called for operating bridge and Caretaker to be appointed.
- 23.8.1907. R. McIntyre appointed Caretaker at £3 per week. Reappointed same salary on 14.2.1908.

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21.1.1909. S.S. "Pioneer" with the "Mount Elliott" in tow came downstream with a strong ebb tide when the "Mount Elliott" ran into the "guide" and the flukes of her anchor caught in one of the timbers. The anchor cable snapped and the whole structure of the guide between the dolphins fell over towards the right bank. Howard Smith Ltd. removed the timber of the guide on a "without prejudice" basis.

Barrister Charles Stumm, gave his opinion on the Council's liability in the matter and added: -

" There is no proclamation vesting the bridge to Council, the only material found being a minute by the then Minister for Works, the Hon. John Macrossan, approving of the handing over of the bridge to Council. "

18.2.1909. Estimated revenue from bridge opening fees £74. 0. 0d.

3.8.1909. "Bobby Towns" and lighter "Mount Elliott", whilst attempting to pass through the bridge, both boats collided with bridge, carrying away part of scaffolding and damaging hand rails. Estimated cost to repair being £20.

28.2.1910. S.S. "Naiad" hit bridge - estimated damage to ironwork of bridge £2.

3.1.1912. The City Engineer, Pat Ahern, reported: -

" Re THE CONDITION OF VICTORIA BRIDGE

The repairs to the bridge have been fairly well maintained for the last 18 years. Previous to that the working and looking after the bridge was let by contract, and there were no provisions made in that contract to keep the bridge painted and free from rust. I cannot say who was then responsible as I was not in charge of the bridge at that time. After the expiration of the above contract, steps were taken to have the bridge scraped and painted. During the progress of this work it was seen that some of the angle irons of the girders of the swing had rusted away; but not to such an extent as to make the bridge dangerous for traffic and is still in the same condition.

The Hydraulic Machinery for the working of the bridge never worked satisfactorily and had to be abandoned and the bridge worked by hand. In 1896 a portion of the south bank underneath the bridge was washed away, with the result that two of the cylinders which were not in bedrock dropped 4 feet 6 inches. Also that portion of the bridge dropped with the cylinders. Steps were then taken to have the bridge raised to its original level. At that time Mr. Stanley, the Chief Engineer for Railways in Queensland, happened to be in Townsville at the time of the accident to the

bridge, and his opinion and advice was asked for by the Council; and he recommended that piles be driven and that the bridge be raised and supported on the piles. This was done and the piles are still supporting that portion of the bridge, and are in good condition.

Previous to the dropping of the cylinders a subsidence took place at those two cylinders and the two next to them on the south bank, and since then there has been a depression on that part of the bridge. I have taken levels to ascertain what subsidence has taken place since the 4th March, 1907 and I find that there has been no subsidence since the abovenamed date, that is to say for 4 years and 10 months.

The placing of the roadway over the bridge in a proper state of repair with tar metal will be taken in hand as soon as possible when the hot weather is over and tar available. "

- 9.1.1912. Council resolved that sections of bridge are to be jacked up and the bridge put in thorough working order.
- 11.6.1912. Town Clerk prepared letter which was sent to Home Secretary requesting permanent closure of bridge.
- 8.10.1912. Home Secretary refused to close bridge. Council requested that the Government reconsider its decision and if adhering

to its decision, then it take over, maintain and keep the bridge in repair.

The Member for Mundingburra was asked to use his influence to have the bridge closed.

12.11.1912. Home Secretary enquired if the Council would indemnify the Government against claims if the bridge were closed.

10.12.1912. Home Secretary enquired whether Council would be prepared to compensate any person prejudicially affected by the closure of the bridge.

Council withdrew its application to have bridge closed.

Council resolved to repeal Victoria Bridge Bylaws.

30.1.1913. Council approved erection of a Bray gas lamp (80 candle power) at the eastern end of the bridge and a gas lamp (16 candle power) at the western end of the swing of the bridge.

Town Clerk was instructed to prepare a Bylaw to amend charges for opening and closing the bridge.

2.4.1913. City Engineer recommended the re-decking of the swing section of the bridge with three-inch iron bark, 9,600 feet of timber required.

13.5.1913. Existing charges for opening bridge cancelled. Council resolved that every owner, officer or

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person in charge of a vessel, being desirous of having the swing portion of the bridge opened, shall lodge an application with the Council or the Officer appointed to receive such application, at least two hours before the bridge is required to be open and pay a fee of 20/-. Between the hours of 11 p.m. and 5 a.m. and on Sundays, double rates will be charged,

5.8.1913. Townsville Gas & Coke Ltd. applied to lay gas main underneath the decking of the bridge. The main would be constructed so that gas flow was mechanically suspended when the bridge opened.

21.8.1913. Council approved request to lay gas main subject to the Company removing the main when required by Council to the proposed new bridge to be built at the foot of Stanley Street.

10.3.1914. Gas Company requested that the bridge opening charges be reduced.

25.5.1914. The following vessels passed through the bridge on this date:

- S.S. "Seymour" down
- S.S. "Carroo" down
- "Albert Ross No.7" down
- (? Albatros)
- "Porpoise" up

No vessels passed through the bridge on 26th May.

8.6.1916. Wooden piles on south side of creek to be coppered.

12.9.1916. Gas Company sought permission to replace gas main under deck with a submerged main. Users of gas on Ross Island had problems when gas supply across bridge was cut off.

Council request police to take action against persons sitting on the swing of the bridge.

14.10.1916. Gas Company supplied Council with details of two schemes for a submerged main.

9.10.1917. Footpath on swing repaired.

17.2.1919. City Engineer reported that the Master of the S.S. "Tully" gave notice of his intention to pass through bridge at 8.00 p.m. up to Chapman & Company's timber wharf. The swing jammed and ship could not pass through until 7.30 a.m. on Saturday morning. Jamming blamed on expansion of steel girders due to Friday's excessive heat. One of the winches jammed as well, and James Smith was hit on the head by the winch handle. He was taken by the Ambulance to Doctor Chapman, who dressed the wound and closed it with six stitches.

5.6.1919. Caretaker's salary increased from £4 to £4. 10s. 0d. per week.

5.5.1920. Between 300 and 400 cubic yards of stone placed on south side of Ross Creek to ensure security of bridge.

8.11.1922. 26 planks replaced in swing decking.

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11.4.1923. Council resolved that a Report be prepared on state of bridge.

3.5.1923. Council resolved to apply to the Government for the permanent closure of the swing section of Victoria Bridge.

Repairs to be effected to the bridge at an estimated cost of £2,000 as reported on below by the City Engineer, C. J. Graham.

" In compliance with instructions I have made an examination of Victoria Bridge, and beg to report as hereunder.

STEELWORK: - Main Girders in good order. Longitudinal Girders in good order,

CROSS GIRDERS: - The Cross Girders in the swing span are in places badly corroded on the lower and upper angles, and at least eight of these should be replaced; as they have only now about fifty per cent of their original strength. Although not actually dangerous under ordinary conditions, there is a certain amount of risk under a concentrated weight such as a loaded road wagon.

BUCKLEPLATES; - Buckleplates generally are in fair condition, with the exception of three plates at the extreme northern end of the Bridge, where they have been concreted over.

CYLINDERS: - Cylinders are in good condition, but in some cases have sunk, throwing the decking out of level.

TIMBERDECKING: - The timber decking is in two ply laid diagonally - the lower four inches being the original decking laid when the bridge was first erected, this is now in a bad state and should be replaced.

PAINTING: - The steelwork has been kept well tarred and protected as much as possible, but there is too great a thickness of old paint and rust, and the whole bridge should be chipped clean and painted with Bitumastic Paint.

ROADWAY: - The roadway is in a very rough state and badly required renewing. Owing to the heavy traffic it will be necessary to have a special topping, and it would be advisable to follow the method adopted at the Byewash Bridge - Dry metal topped with good quality asphalt.

RECOMMENDATIONS

CROSS GIRDERS: - Two new Cross Girders should be obtained and used for replacing faulty girders, these old girders could be reflanged, and used to replace a further two and so on.

TIMBERDECKING: - If a heavy kerb be laid along the middle of the Swing span and cleats be bolted thereto underneath the decking, the whole of the decking along one half of the bridge could be cut away, and replaced by new timber laid longitudinally, the traffic being regulated along the other side of the Roadway.

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The traffic could then be turned into the new work, and the other half of the bridge treated similarly. There would be a certain amount of inconvenience and delay caused by the congestion of traffic, but if the timbers were got ready beforehand the work could be finished in a fortnight. There would be no necessity to close the bridge during the progress of the repairs, "

3.7.1923. Saunders appointed as Caretaker.

12.7.1923. S. W. Swales, Engineer, reported on the condition of the bridge as follows: -

" As instructed, I have thoroughly examined Victoria Bridge and beg to report as follows: -

LONGITUDINAL GIRDERS are all in good order.

CROSS GIRDERS - These girders which are in the Swing part of Bridge are more or less corroded on the top and bottom angles and require attention as they take the whole weight of traffic.

CYLINDERS - In good order and condition.

FLOORING PLATES - These appear to be in good order with the exception of two plates under the footpath, but as there is no great weight on them, they do not affect the stability of the Bridge.

FILES - These require a little attention as regards the copper.

In conclusion, I may state the Bridge has been generally well cared for. The corrosion which has taken place on Girders, has been caused by the dust etc., (which gradually works its way between the time and iron-work) together with salt air and moisture.

21.8.1924. Council resolved to approach the Treasurer for the permanent closure of the bridge.

23.9.1924. Gas Company complained, as set out below, of the inconvenience caused to gas consumers by the opening of the bridge: -

" I have been directed to bring before your notice the annoying inconvenience that the gas consumers on the south side are being subjected to, through the opening of Victoria Bridge. Only very short notice is being given to this Company of the intention to open the bridge, consequently gas consumers know nothing of the matter until there is evidence of escaping gas, and they then discover that their oven gas has been cut off, and their cooking contaminated due to the re-connecting of the supply. This could be avoided if it were possible to publicly advertise the intention to open the bridge.

If it is within the power of your Council to protect ratepayers from such inconvenience and expense, might I ask that your Council exercise that power.

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From complaints received, we learn that at times the bridge is opened before everything is in readiness with the boat, thereby prolonging the cutting off of the gas service.

I trust that your Council will do what they can to curtail this inconvenience as much as possible. "

13.11.1924. The Mayor, Alderman Anthony Ogden, and Aldermen Hopkins and Pease approach Chapman & Company, timber merchants, about the closure of Victoria Bridge.

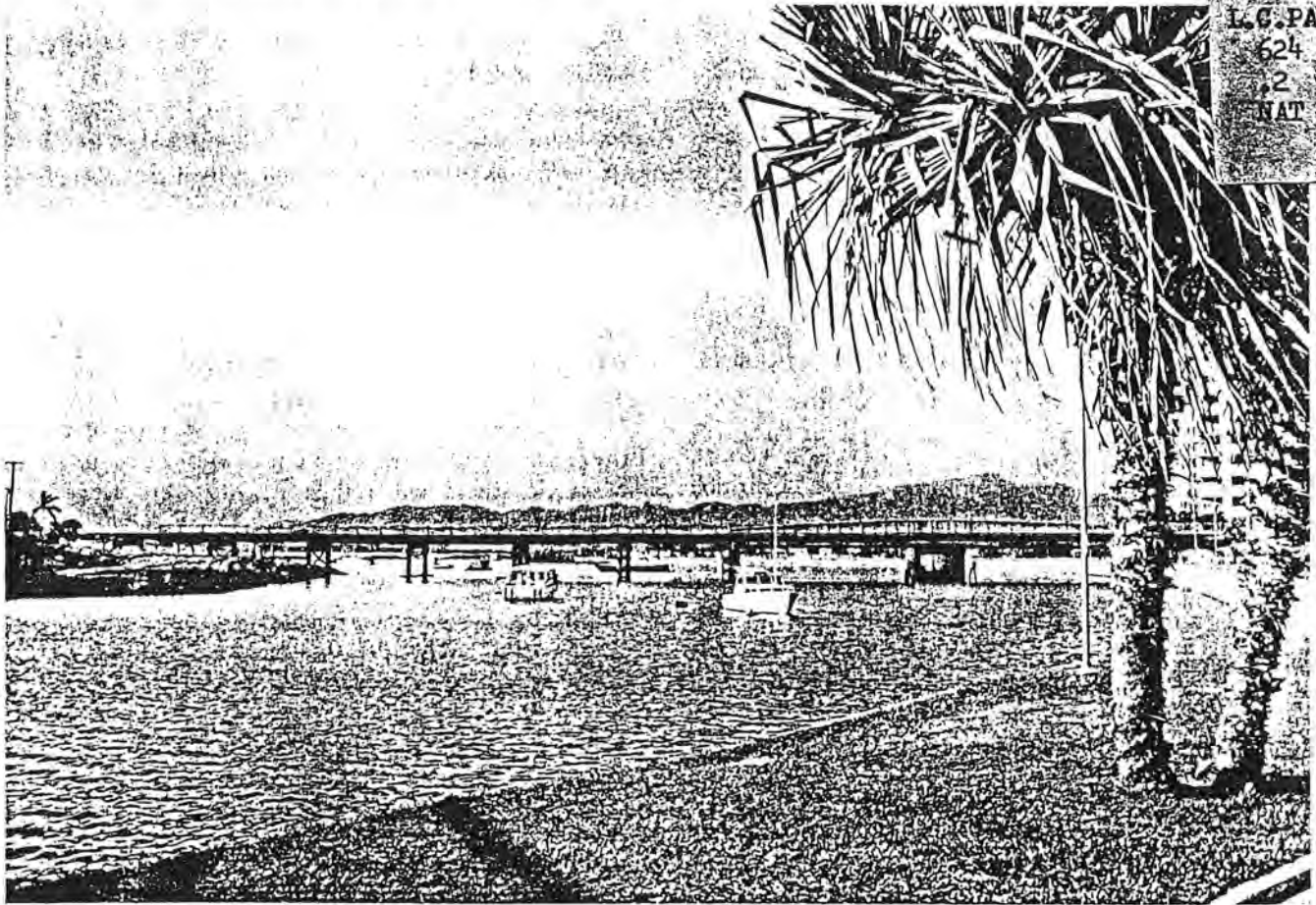
5.11.1925. The Townsville Bridges Act of 1925 assented to,

An Act to Authorise the Council of the City of Townsville permanently to maintain Victoria Bridge over Ross Creek, and to construct and maintain a new Bridge over Ross Creek within the said City without making Provision for the Opening of a Portion of such Bridges for the passage of Vessels, and also to Construct and Maintain a way over or adjacent to the said Ross Creek; and for other consequential purposes.

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TOWNSVILLE'S HISTORIC SWING BRIDGE

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Husband and wife team, Bruce and Dorothy Gibson-Wilde, have a keen interest in the heritage of North Queensland and have become particularly interested in the preservation of Townsville's Victoria Bridge. Bruce is a senior lecturer in physics at the James Cook University of North Queensland and Dorothy is completing her honours thesis in history on the Townsville townscape. Their combined talents have equipped them well for their study of this historic bridge which they discuss in the following article.

Spanning Ross Creek in the heart of Townsville, Victoria Bridge is an historic iron swing bridge completed in 1889. Movable bridges have a very long history, as they are known to have existed in Egypt over 3000 years ago, but it is not clear when the principle of the swing bridge was invented. A Frenchman, Salomon de Caux, is known to have erected a swing bridge across a channel in the docks at Cherbourg, France, in the first half of the seventeenth century. However, it was not until the development of the new technology of the Industrial Revolution introduced the Age of Iron and Steel to bridge building, that the swing bridge came into its own.

The first bridge was erected at Coalbrookdale, England, in 1777 by the ironmaster Abraham Darby III. Exactly when the first iron swing bridge was built is unknown, but one was installed in the old London Docks about 1805.

The first swing bridge in Australia was of timber and was erected over Blackwattle Creek in New South Wales in the first half of the nineteenth century. In Australia, all iron and steel had to be imported from England so their use for bridgebuilding was quite limited until the establishment of steelworks at Newcastle, N.S.W., in 1915. Research so far has not revealed exactly when the first iron swing bridge in Australia was built, but Victoria Bridge over the Brisbane River must have been one of the earliest. It was completed in 1874 but was partly swept away in the floods of 1893 and was later replaced.

A number of iron swing bridges were subsequently erected in Australia but now only four remain. The oldest of these is located near Sale in Victoria. It was built in 1883 and is notable in that it was totally Australian, even the iron used for its construction being made at the Tyne Foundry, Melbourne. It was operated by hand by using two central winches fixed on the outside of each truss by cast iron brackets. Of the iron swing bridges erected in New South Wales, only those at Glebe Point (1901) and at Pymont (1902) remain and the Pymont Bridge is scheduled for demolition. Both of these were operated by electricity.

The fourth survivor is Victoria Bridge, Townsville. It differs from the other surviving iron swing bridges in Australia in that its mechanism was powered by gas. The

gas engine used to operate it is still in position in the central pylon and is in reasonable condition. It is an Otto and Crossley patent gas engine of the horizontal type manufactured by Crossley Brothers of Manchester.

A number of attempts were made to perfect the gas engine in the mid-nineteenth century, but it was Otto who produced the first successful model. As Douglas Clerk points out in *The Gas Engine* (London, 1886) 'Before him much had been done in inventing and studying engines but it remained for him by sheer perseverance and determination of character to overcome all difficulties and reduce to successful practice the theories of his predecessors'. He and his partner, Langen, exhibited their free piston engine with flame ignition for the first time at the Paris Exhibition of 1867. It was extremely noisy and in 1876 Otto brought out a new model as the 'Otto silent' engine. This was a vertical engine and a little later he developed the horizontal model. As very few of these engines survive, the one at Townsville is an extremely important industrial archaeological relic.

Victoria Bridge has played an important role in the history of Townsville which was founded in 1864 as a port for the stations of the North Kennedy. The first wharves were built on the northern bank of Ross Creek in the area now known as Eastern Flinders Street, and it was this area that the township developed. The southern

side of the creek was not included in the municipality of Townsville; fringed with dense mangrove scrub, it was in reality an island, formed by the delta of the Ross River and known as Ross Island. It was inhabited by Aborigines and was the haunt of numerous crocodiles.

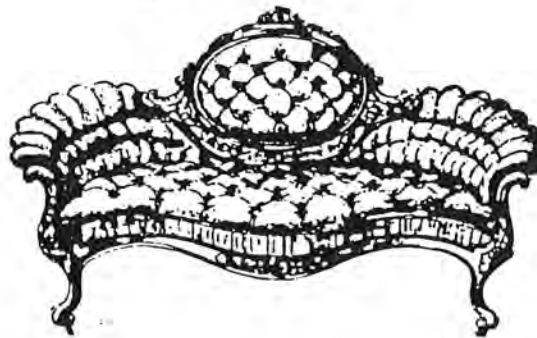
The beginning of settlement on Ross Island came with the building of the Burdekin and Flinders Hospital there in 1868. One cannot but wonder at the discomforts that must have been suffered by patients being transported across the creek in a punt. The Pilot Station was also established on the southern side of the creek, as were the police horse paddocks and a few farms. Transport across the creek was by ferry. However, as late as 1873 the population of Ross Island numbered only about 25.

At that stage all harbour facilities were in Ross Creek. Only small vessels could enter to moor at the wharves in the creek; larger vessels were forced to moor in the lee of Magnetic Island while their cargoes were carried by lighter to the wharves in the creek. As the population in the north increased and the number of vessels using the port of Townsville rose rapidly, the need for improved harbour facilities became urgent. In 1875 the decision was made to build a jetty sheltered by a breakwater built out from Magazine Island which was on the Ross Island side of the creek.

Merchants and businessmen with premises and wharves on the northern side of the creek saw themselves

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being cut off from the new jetty with only the inadequate ferries for communication. Their consternation was increased by the announcement that the new railway to be built to the west would terminate at Ross Island. Many envisaged Ross Island as being the new centre of Townsville and saw the value of their properties on the northern side of the creek dropping. As work started on the harbour improvements most of the workers involved chose to live on Ross Island, as did many of the workers building the new railway. The population there increased rapidly.

As a result, agitation for a bridge over Ross Creek came from all sections of the community and the government was agreeable to the proposal. At first, the Inspector General of Roads, Frederick J. Byerley, recommended that it be built at Denham Street where the present George Roberts Bridge crosses the creek, but subsequently he decided that it should be built at the mouth of the creek near the site of the present Metropole Hotel. Despite the public outcry that it would be a hazard to shipping proceeding to the wharves in the creek, the government proceeded with the erection of the bridge. During its construction a number of vessels attempting to enter the creek fell foul of it and suffered damage.

Built mainly of Maryborough timber, it contained a drawbridge with massive ironwork and Byerley estimated that it would take two men to operate the winches to raise this drawbridge. On 8 March 1879 John Murtagh Macrossan, then Minister for Works, arrived in Townsville to inspect the bridge before it was opened to the public. The drawbridge was raised only with the greatest difficulty and it required the efforts of seventeen men. It was obviously a huge and embarrassing engineering blunder and was removed without being opened to the public. The materials were used in the construction of the railway.

For a brief period, agitation for a bridge ceased. The government agreed to the deviation of the railway so that the terminus was on the north side of the creek and work stopped on the harbour improvements. The population of Ross Island, however, continued to grow. Those thrown out of work by the stopping of the harbour works found jobs in other areas and the railway needed a continual supply of labour. New migrants were arriving continually and many settled on Ross Island. By 1882, when work on the harbour improvements recommenced, there was agitation on Ross Island for the area to be included in the municipality of Townsville. On 3 February 1883 the Townsville correspondent of *The Queenslander* announced that 'At last the Government has seen fit to annex Ross Island to our municipality'.

Ross Islanders, however, were not satisfied. They could not enjoy the benefits of other parts of the town without a bridge across the creek. By late 1883 Ross Islanders were calling for a separate municipality for Ross Island. The steady progress of work on the harbour improvements was also causing some consternation again among the businessmen on the northern side of the creek,

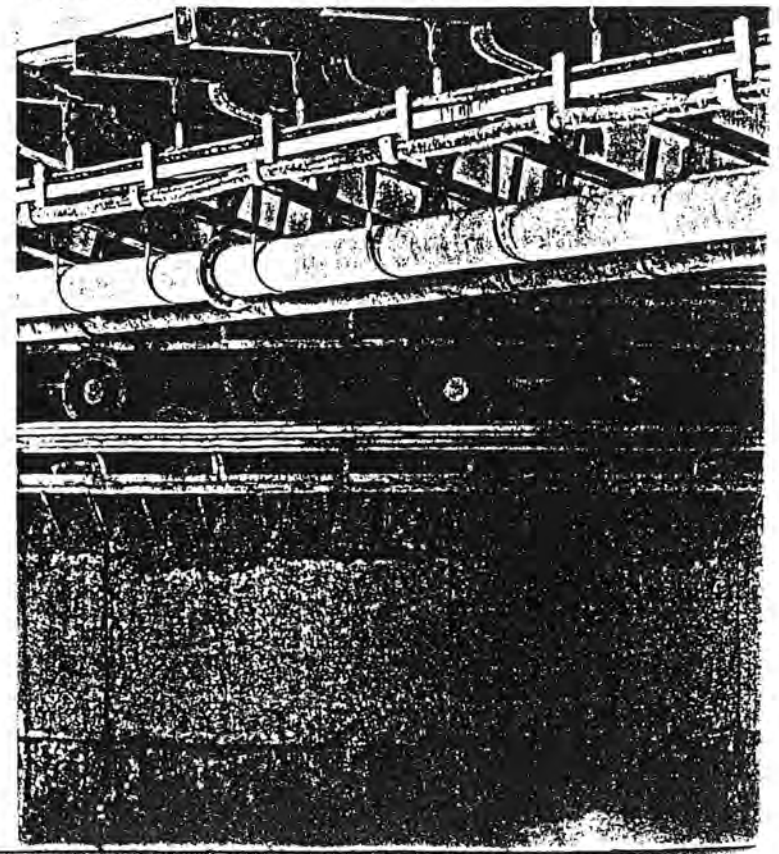
referred to by Ross Islanders as 'The Creekocracy'. So once again the government decided to build a bridge over Ross Creek.

In 1884 much discussion and dissension arose over the location of the proposed bridge. A site at Stokes Street eventually was chosen since it would be cheaper and closer to the business centre of the city. The Government Engineer for Bridges, John H. Daniells, was instructed to prepare plans for an iron bridge with a swing section to be erected at the foot of Stokes Street. His design was for a bridge 550 feet in length with a swing section of 150 feet constructed of Bessemer steel with a carriageway of timber to reduce the weight.

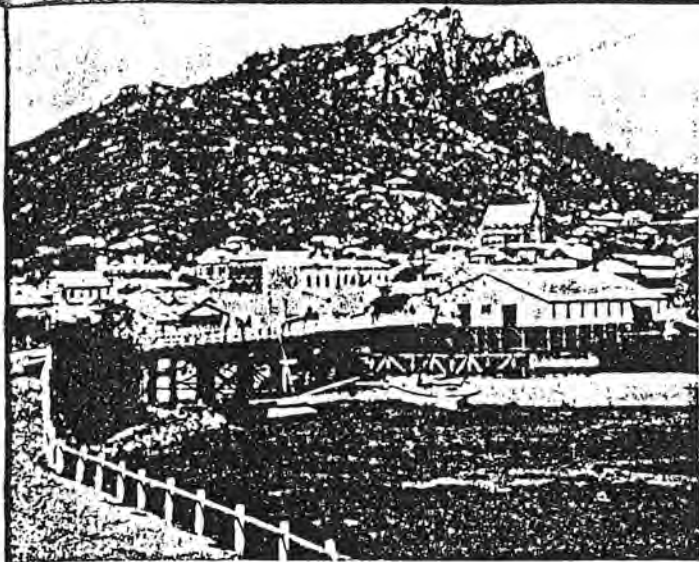
The swing section revolved on sixteen cast steel conical rollers running on a bottom roller path which was bolted to the cast iron cylinder forming the main pier. This cylinder was lined with concrete. Inside the main pier was a cylinder 6 feet in diameter which formed both the pivot on which the bridge swung and the casing for the accumulator for the hydraulic machinery for opening and closing the bridge. To do this, cylinders and rams were fixed under the footways. These acted on two 1 1/4 inch chains which were attached to the bottom of the roller plate. One of the chains opened the bridge and the other closed it.

The motive hydraulic power was supplied by the accumulator which was charged by three pumps driven by the Otto and Crossley gas engine which was housed in the engine room in the main pier. When closed, each end of the swing section rested on piers made up of two cast iron cylinders each 5 feet in diameter. It was secured by four wedges inserted under each corner of the swing.

The central pylon of Victoria Bridge, showing rollers.



Appl



A view of Victoria Bridge in 1902. (From the original in the John Oxley Library.)

These were removed and inserted by four hydraulic cylinders also powered by the central accumulator.

The fixed section consisted of seven iron spans on the southern side and three on the northern side. These spans were formed by shallow wrought iron plate girders thrown across piers of cast iron screw cylinders 2 feet in diameter. The cylinders were strengthened by wrought and cast iron bracings. The road over the fixed spans was formed by buckled plates on which road metal was laid.

Tenders were called on 10 July 1885. The contract for both materials and construction was awarded to George Herbert Royce and Co. of Sydney and London. Royce almost immediately departed for London where he supervised orders for material from his office at 33 Broad Street. In a letter of 22 June 1886 he advised Daniells 'that the whole of the cylinders are being manufactured by Messrs Head Wrightson and Co. of Middleborough, England, the superstructure by Messrs Lecoq of Halle Belgium and our London Office advises us under date April 5th that they believe Mr Lecoq is going to entrust the hydraulic work to Messrs Owens and Co of Whitefriars, London'. It is interesting to note that Head Wrightson are still in business at Teesdale Works, Stockton-on-Tees, England.

Construction commenced in December 1886 with the building of a pile-driver. The resident government engineer was James Laurie and his job was not an easy one. Much difficulty was experienced in sinking the piles into the granite of the creek bed. The central pier could not be made watertight and it was necessary to place another iron cylinder inside it. On 27 April 1887 the embankment on the Ross Island side collapsed and about 200 feet of the superstructure sank into the mud. This set back work considerably.

Criticism of the siting of the bridge continued. Critics insisted that it would have to suffer the fate of the first bridge. Captain Heath of the Department of Harbours and Lighthouses condemned it as 'being placed just at an elbow of the creek so that a vessel cannot get her head

pointed for the opening and straightened up in sufficient time before reaching the bridge'.

At last, in June 1889, work was completed. The local firm of Robertson and Stein built the approaches on both sides. Final tests were carried out in the last week of June 1889 under the supervision of Alfred B. Brady, Acting Engineer for Bridges, who in 1891 became Government Architect and was responsible for the design of many of Queensland's finest public buildings, including the Customs House at Townsville. Brady praised the workmanship of the contractor as first class. He approved the working of the gas engine, hydraulic machinery and the swing mechanism, but was critical of both the design and the location.

Brady felt that the siting would have been better if the bridge had continued the line of Stokes Street and that it would not have been any greater hazard to shipping. He also pointed out that while two openings for vessels were provided by the design, only one could be used. 'The opening at the town end being near a shallow part of the creek having a dangerous rocky bed immediately below the bridge renders it impossible for vessels to pass through on that side with safety. As a consequence the opening at the side is the only one available for craft going up or down the stream. This occasionally necessitates keeping the bridge closed to road traffic for a longer period than would otherwise have been necessary'.

The bridge was handed over to the Council on 1 July 1889. Heated debate surrounded the choosing of a suitable name. Quite clearly it was recognized that the new structure would provide an important link between harbour and city, ensuring that Ross Island became a part of Townsville and not a separate municipality, as well as having a tremendous impact on the development of Townsville. The names Parkes Bridge (after Mayor J.N. Parkes), Stokes Street Bridge, Ross Creek Bridge and Griffith Bridge were considered. Finally, the spirit of Empire apparently prevailed and the name Victoria Bridge, proposed by Alderman Martin and seconded by Alderman Clegg, was agreed upon.

On 2 July 1889 the formal opening ceremony took place, attended by the councillors and a crowd of spectators at both ends. The mayor 'hoped the bridge would remain for many a day a bond of union between those on

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each side of the creek'. The first vessel to pass through the new bridge was the *Nebo*, a lighter belonging to Howard Smith and Co.

The Council's joy at finally having bridged Ross Creek did not last long. It has not been possible to prove conclusively that Victoria Bridge was the only swing bridge of its kind built in the tropics in the nineteenth century, but it would certainly seem that few precedents existed for its design. In the extremely hot weather the steel expanded and the swing wedged firmly shut. Lecoqs had wanted an extra expansion joint inserted but Daniells thought it unnecessary — Lecoqs had been correct!

A number of problems arose with the machinery. John Stein the engineer and his successors appear not to have fully understood the working of the mechanism. They may have found the gas engine almost impossible to work with as it must have been extremely noisy in the confined space of the engine room. At times the gas supply failed. A particularly bad failure occurred when the big flood of 1890 inundated the gas works.

By January 1891, the council was claiming that the government had saddled them with a perfect white elephant. The premier did not find this amusing and dismissed the complaints, stating that '... they amazed him. They had clamoured for a swing bridge and got it. They could not have it without expenses. Surely the ex-

tra rates from Ross Island would make up the expense. Surely it was a stale thing to complain at the machinery 18 months after it had been taken over'.

The council retired hurt and looked at better ways of maintaining the bridge. After a time it proved easier to open the bridge by hand than by using the machinery. Under these circumstances, it served a very useful life for many years, opening on average about twice a day. It suffered major damage in cyclone Sigma in 1896 but was repaired quickly on the advice of H.C. Stanley, the Engineer for Railways. It suffered no damage in any of the succeeding major cyclones which have descended on Townsville over the years. In December 1896 the designer, J.H. Daniells, by then in private practice as a civil engineer and architect in Townsville, pointed out that the sinking of some of the screw piles was not due to faulty design but to the fact that the bridge, tested for loads of 20 tons, had been subjected on at least one occasion to a load of 120 tons which remained on it for four hours.

In many ways it would appear that Victoria Bridge was ahead of its time, built in a tropical environment not thoroughly understood, in a township which had been founded for only twenty-one years and among people who could not possibly have understood or appreciated the engineering problems involved. Nevertheless it did fulfil its purpose. It linked the north and south banks of Ross Creek and provided access from the city to the harbour. Until 1925 it was the only road crossing the creek. Without it Townsville could not have developed as quickly or in quite the same way. When the erection of the bridge at Stanley Street was approved in 1924, it was agreed that Victoria Bridge need no longer be maintained as a swing bridge and it was wedged shut. No record has so far been discovered of the last time a vessel passed through it.

Victoria Bridge continued in use until 1975, providing an essential communication link during World War II when Townsville was a major strategic centre. In 1975 the new George Roberts Bridge at Denham Street was built and the then City Council planned to demolish Victoria Bridge. However, public outcry was such that it was retained, although the approaches on both sides were partly removed. It has been listed by the National Trust of Queensland, but the problem of its restoration remains. Its loss would remove yet another of the world's rapidly diminishing stock of such relics.

John Buchan in *Introduction to British Bridges* (1933) considered that 'history... clusters more thickly about bridges than about towns and citadels'. History, both of technology and of the city of Townsville, certainly clusters about Victoria Bridge. With the increasing national interest in such historic structures, the preservation of the Victoria Bridge would be a unique monument to the engineers and builders who pioneered the erection of such structures in this country.

(Editor's Note: References and acknowledgements supplied by the authors will be made available on written application to the Editor).

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