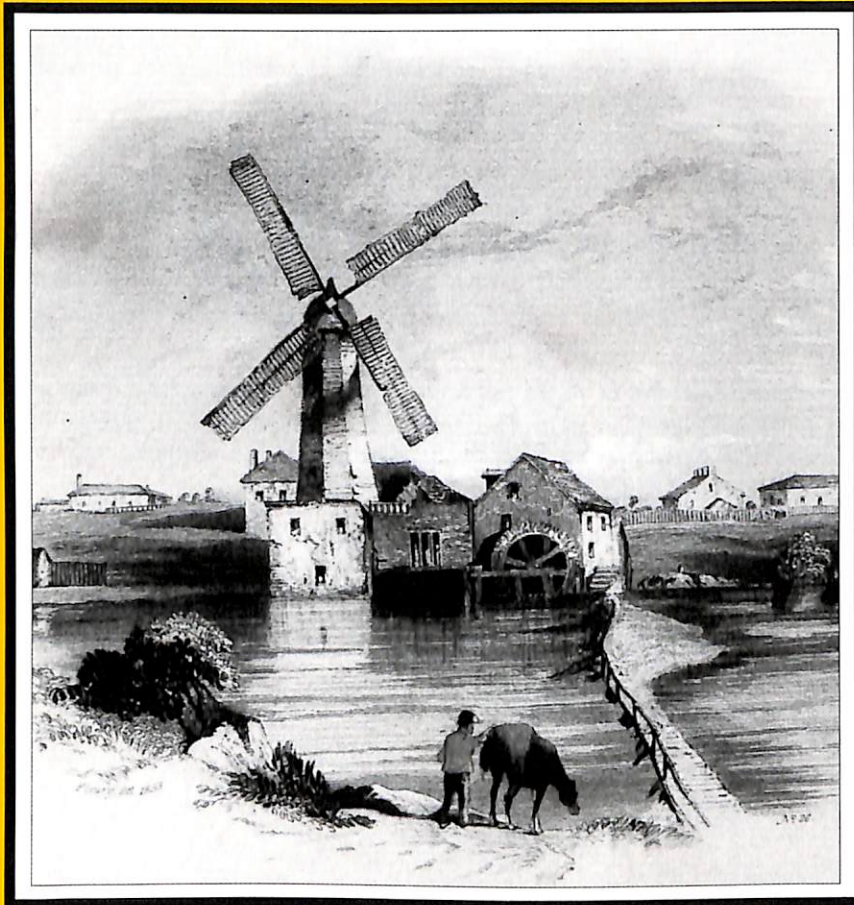


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The Lydiard St. Railway Gates, Ballarat - The Drama of their Preservation

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SUMMARY: In 1990 the authors were approached by the City of Ballarat to represent them at a meeting with the Victorian Public Transport Corporation (PTC), on technical matters relating to the preservation of the historic Lydiard St. railway gates. At that time the PTC were re-signing the Ballarat railway yards and were intending to replace the rail gates with standard Boom Barriers and flashing lights. The City of Ballarat wished to retain the rail gates to blend with and enhance the historic street scape of Lydiard St. and the railway station precinct. Over a period of eight years since then a running battle has been occurring between the PTC who wish to remove the gates, and the City of Ballarat, National Trust, and Historic Buildings Council, who wish to retain the gates. This paper presents the chronological history of that battle, and documents the various occurrences which have lead finally to Victorian State Government calling for the retention, rehabilitation, and automation of these historic gates.

1 HISTORICAL BACKGROUND

The Lydiard St. railway gates were installed in 1885 on the main western rail line to Adelaide out of Ballarat. The gates are known as sector gates, in that their operating mechanism is chain driven pulley sectors below ground, and operated by the signalman in the adjoining signal box when required. Figure 1 shows the general layout of the gates and the adjoining signal box. It will be noted from the figure that the gates are skewed to the road line, and hence have different operating angular swing (70° and 110°) and hence have differing radii sectors on their mechanisms.

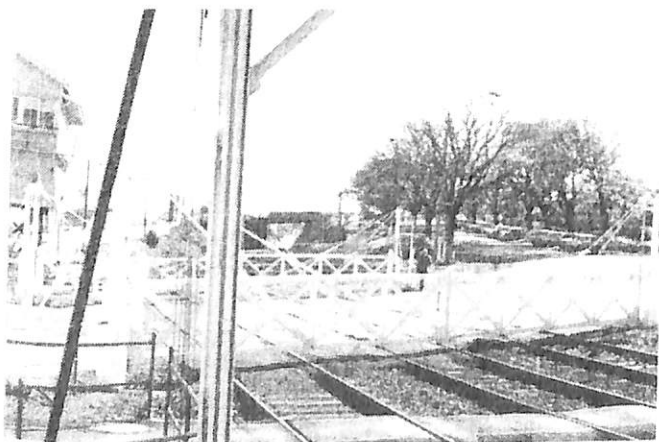


Figure 1 Lydiard St. Railway Gates

(Fig. 2) shows the sector mechanism below one of the gates.

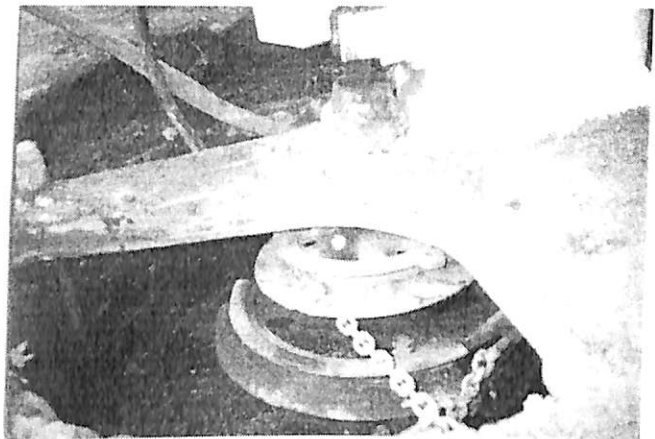


Figure 2 Sector Mechanism

It is thought, though unsubstantiated, that these gates are one of the few remaining examples of sector gates in both Australia and the world. This was one of the reasons that the City of Ballarat and other parties, wished to retain the gates.

2 FIRST MEETING WITH THE PTC

On the 20th of December 1990, the authors were approached by the City of Ballarat, to assist them at a meeting with PTC representatives at Ballarat railway station to discuss the future of the gates, and a possible plan for automation of the gates.

* Paper first presented to the 9th National Conference on Engineering Heritage, Ballarat, Australia, 1998.

2.1 Re-signalling

The PTC were in the process of replacing the manual signalling railway in the Ballarat Area with modern track circuited colour light signals, and ideally wished to replace the gates with automatic boom barriers and warning lights.

All other grade crossings in the area were being replaced by boom barriers, and the Lydiard St. crossing was having the necessary wiring and signalling controls placed, in anticipation of gate replacement.

The main arguments placed by the PTC for boom barriers concerned the speed of passing trains through the crossing, and in particular interstate (SA) freight traffic. The speed was to be increased from the then current 15 Km/Hr to 40 Km/Hr, in particular for the planned standardisation of the rail lines through Ballarat. The PTC argued that manual rail gates would impede the flow of rail traffic through the Ballarat rail precinct, disrupting schedules and resultant income. It was also argued that boom barriers, being a standard installation design, were the cheapest option for the Lydiard St. crossing.

2.2 Automation

The Ballarat City Council wished to retain the rail gates because of their aesthetic value within the general historic street-scape of Lydiard St. It was argued by them that boom barriers and the associated flashing lights were incongruous with the historic nature of the street. (Fig. 3) shows the general street-scape of Lydiard St., with the gates in the distance.



Figure 3 Lydiard St. North.

The PTC agreed that the current rail gates enhanced the street-scape and could see value in the gates remaining.

At this juncture in the meeting representatives of the PTC Signalling Division presented a specification for automation of the Lydiard St. rail gates to enable automatic operation of the gates from the signalling system within the Ballarat area.

2.3 Cost

The PTC specification for the retention and automation of the gates required total replacement of the gates with metal replicas, closed circuit television monitoring of the gate area with seven cameras using optical fibre communications to the station, a distance of around 50 metres, and the installation and maintenance costs for the automated gates, above the cost of boom barriers, to be born by the City of Ballarat.

The estimated costs for automated replica gates being in the vicinity of \$ 600 000, compared to \$ 160 000 for the standard boom barriers, exclusive of maintenance (1990 costs). Added to this, the maintenance of the gates was to be by PTC personnel only at commercial rates to the City.

Such a proposal was clearly unacceptable to the City of Ballarat.

3 SUBSEQUENT MEETINGS

3.1 February 1991

At a meeting on the 12th of February 1991, the PTC, after full examination of these (PTC) automation plans by the authors, agreed that the costs could be considerably lower depending on various design options, particularly the retention of the existing wooden gates.

The automation costs were now seen to range between \$ 33 000 and \$ 290 000.

3.2 June 1991

On the 15th of June 1991, Graeme Hood submitted plans to the Historic Buildings Council (HBC) for automation of the existing wooden gates with estimated costs.

On the 23rd of June, Ray Martin attended a meeting between the PTC and the HBC in Melbourne to examine the significance of the gates, where the PTC put a case for removal of them. Other evidence from the National Trust and the City of Ballarat put the opposing case for retention of the gates to the HBC. A very late submission on this day by the Signalling Division of the PTC was rejected by the HBC as out of order.

On June 25th, the HBC rejected the demolition order on the gates by the PTC and acknowledged their significance.

3.3 Meeting with the Minister, 1993

Over a year now passed in which little action occurred.

On the 30th of September 1993, the Victorian Government Minister for Planning, Mr. Rob McLellan, met with Graeme Hood, and representatives of the PTC, HBC, City of Ballarat, and the National Trust to discuss the future of the Lydiard St. rail gates.

From this meeting, the Minister directed that automation of the gates be seriously considered by the PTC, and that they were to confer with the authors on this matter.

This resulted on the 23rd of December 1993, three years on from the initial meeting, an agreed and documented plan between the PTC and the authors for the automation of the gates with much less onerous conditions for monitoring them ie: it was agreed that video monitoring was not required.

4 TENDERS CALLED

In February 1994, a letter was received by the authors from the Minister for Planning, acknowledging the feasibility of automation of the existing gates and advising that the PTC had been directed to call tenders for the gates' automation. The tender was issued in the Age newspaper on the 24th of June.

Additionally, the HBC had allocated an extra \$83 600 to assist with the automation costs.

In late August the authors were asked to examine the tender specifications to see if they were fair and appropriate. In general the authors considered the specifications so, except the requirements for a mean failure rate (of any part of the gates, mechanisms, or signalling interface) of 1 in 1000 operations, and a 20 year maintenance guarantee.

Tenders closed on the 30th of August 1994.

4.1 A Lack of Communication

From August 1994 to December 1996 the authors heard nothing from the PTC as to the results of the tender, nor did the HBC, National Trust, or the City of Ballarat. The issue of the gates and their automation, retention, or demolition seemed to disappear into the unknown. Only at a much later hearing on the gates (documented later), did these parties become aware of what had occurred with the tender for automation.

4.2 Boom Gates Again

On the 20th of December 1996, the PTC applied to the HBC for the demolition of the Lydiard St. gates and their replacement with boom barriers.

Arguments now arose between the PTC and the City of Ballarat on this matter, with luckily little action be-

ing taken by the PTC. This resulted in April 1997, with Graeme Hood requesting a report from the City of Ballarat on current developments with the gates.

In June 1997, the authors were requested by the City of Ballarat to submit preliminary designs and costing for the automation of the gates.

4.3 An Inquiry into the Lydiard St. Railway Gates

The Minister for Planning directed that a hearing be held in Ballarat into the future of the railway gates, at which a panel of three would examine witnesses from all interested parties, into the future of the gates.

It was only at this inquiry, that the authors finally found out what had happened with the tender for the automation of the gates.

5 THE 1997 BALLARAT INQUIRY

Between the 14th and 17th of June 1997, an inquiry into the future of the Lydiard St. rail gates was convened at the Ballarat Town Hall.

The four panel members forming the inquiry were:

Mr. Geoff Sutherland, Civil Engineer;
Prof. Nick Beattie, Head, School of Architecture, Deakin University;
Ms Margaret Pitt, Chair Advisory Committee;
Mr. Andrew Clarke, Member Advisory Committee.

Witnesses for the PTC, National Trust, and the City of Ballarat were called over the four days, with the authors appearing for the City.

From evidence given by the PTC, it was learnt that two railway signalling companies had submitted tenders for the automation of the gates, but that the costs were extraordinarily high. The highest being over \$1M for automation. It appeared to the pro-gates side, that though automation was feasible, and admitted so by PTC signalling engineers, no one really wanted to do the job of automation. It appeared from questions at the hearing that such a proposal was outside the established designs for railway grade crossing control, and no one wished to redesign a suitable system.

5.1 Costing

During the course of the inquiry, cost estimates for refurbishment, replacement, and manufacture of gate components was given by the PTC at around \$500 000. The authors considered that such estimates were outside the realms of reality, and called in local manufacturers during the inquiry to give costs for the same items from Ballarat suppliers.

Local manufacturers gave estimates of around \$50 000 for the same components.

Close scrutiny of the original tender documents lead to claims that the long term guarantees and warranty as well as a 20 year maintenance contract with penalty clauses would discourage contractors.

5.2 Automation Options

The authors were asked to consider various options for automating the gates, these being:

- Removal of the current sector mechanisms, and individual drives for each of the four gates, the authors favouring pneumatic drives with failsafe design.
- Retention and refurbishment of the sector mechanisms with the associated hand-wheel operation from the nearby signal box, and the fitting of an electric drive to the hand-wheel. This was the favoured option by the National Trust and HBC as it retained both the gates and the operating mechanisms.

5.3 The Decision

In September 1997 a belated report from the advisory committee concluded that the second option - Automation of the driving wheel - is the most appropriate solution.

The committee was satisfied that the option was practicable, simple and economical and stated that the PTC had an obligation to pursue the option with full commitment (something it had failed to do in the past).

A final recommendation was made in which a cooperative and committed approach was suggested in order to fully develop and implement the automation of the gates hand-wheel.

6 IMPLEMENTATION OF THE AUTOMATION OPTION

Toward the end of 1997 a Lydiard St. gates implementation working group was formed. The working party consisted of representatives from Victorian Rail Track, the City of Ballarat, the University of Ballarat, Heritage Victoria and the Victorian Department of Infrastructure.

The terms of reference for this group were to advise the Minister on the feasibility of the recommendation

of the advisory committee and to confirm that the gates can be automated for a cost of \$300 000. Additionally, the working group will identify the arrangements necessary to ensure that Victorian Rail Track can implement a safe automated system.

At this point in time (January 1998), the working group is having a risk analysis undertaken by independent professional consultants. It would appear that the fight to retain the gates has now moved past the adversarial stage and on to a commonsense plateau where hopefully all parties are working together to retain this wonderful piece of our heritage.

7 CONCLUSION

At the start of this fight for the preservation of the Lydiard St., railway gates all that could be heard was:

- 'They are too old, throw them out',
- 'You can't automate the gates because they are wooden',
- 'It will cost a fortune to implement such a process',
- 'Gates are unsafe compared to boom barriers',
- 'We do not have the expertise to repair them',
- 'They will be preserved better if we take them out'.

The authors considered all along that this was not the case and at every turn were able to argue effectively in support of the gates retention. There is no substitute for vigilance in heritage issues.

In our desire to become a modern and progressive society we destroyed many valuable parts of our heritage in the belief that new and old are incompatible. The Lydiard St. gates saga should be proof that we can have them both. Imagine, a set of gates and mechanisms designed and built in the late nineteenth century being minimally adapted to operate in an automated world over a century later. It has not been done before but everything has a first time.

8 POSTSCRIPT

In July 1999 the Victoria State Government agreed that the Lydiard St. railway gates were to be automated. The engineering consulting company, Indec, has been engaged to carry out the design work based on preliminary design and costings carried out by the authors in 1987, and supervise the installation of the automation mechanisms.

Conservation Planning and a 1905 Electric Tramcar*

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SUMMARY: *Following the recovery of the remains of an electric tramcar built for Ballarat in 1905, the Museum undertook the preparation of a Conservation Plan using the Institute's Heritage Guidelines. The paper reviews the background history of the tramcar, its place and significance in the development of Ballarat. The considerations determining the work needed to return it to an operable condition and the advantages from undertaking of the process itself are examined. The process gave a far better understanding of the cultural heritage of the object itself and resulted in better considered decisions.*

1 INTRODUCTION

1.1 Why Plan?

Electric Supply Co. of Victoria Ltd. (ESCo) Ballarat Tram No. 12 is a historically significant electric tramcar, having been built in 1905 for the electrification of Ballarat's horse tramways using the body of an 1892 Sydney cable tram trailer. The social, technological and historical aspects of the tramcar are worthy of ensuring its retention as a museum exhibit and one that contributed to the National wealth of the time.

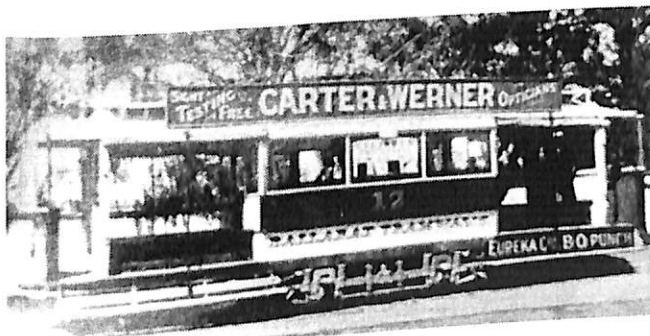


Figure 1 ESCo Ballarat No. 12, 1913c after fitting with windscreens for the passengers' comfort! BTM Collection

The purpose of a conservation plan in this case is to provide an understanding of the object to be exhibited. It determines the significant elements in order to

* Paper first presented to the 9th National Conference on Engineering Heritage, Ballarat, Australia, 1998.

form a policy for future work and enable a flexible approach to any work that may be undertaken.

Any reconstruction of the tram by the Museum to an earlier state needs to be carried out in a method that recognises its significance. The process should not needlessly destroy or conceal evidence that may be useful to people in the future investigating the original recovered remains of the object.

Reconstruction needs to be executed in a manner that replicates the operating characteristics of the original vehicle. The social aspects that it once operated in must be represented and provide an effective means of interpreting it to the museum visitor.

1.2 Background History of the 1905 Tramcar

Ballarat, a rich and prosperous gold mining town of the late 1800's, saw a privately financed and operated horse tramway open in December 1887. The development of electricity and electric trams in the later part of the 1890's and the early 1900's saw the spread of electric tram systems throughout the world's larger cities. Ballarat was such a city, being one of Australia's largest inland cities and its citizens desired a modern image. It was thus attractive to the private developers of electrical systems and equipment suppliers.

In this environment, the Liverpool based British Insulated Wire Company through a subsidiary company, the Electric Supply Company of Victoria Limited, purchased the Bendigo steam tramway in 1899 and the Ballarat Tramway Co. in 1902. They electrified the Bendigo system in 1903. Work in the Ballarat started in 1904 with the first lines opening on 18 Aug. 1905.¹

When ESCo electrified the Bendigo Tramways it built a new depot and bought brand new trams. It is thought that too much money was spent on the Bendigo conversion. Therefore, when Ballarat's turn came to upgrade, the Wendouree horse tram depot was retained and the rolling stock was mostly recycled Sydney tramcars.²

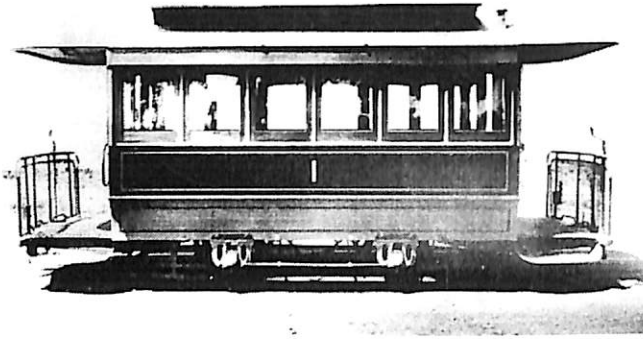


Figure 2 The saloon or centre section of ESCo No. 12 was formed from a Sydney cable tram trailer of 1892 vintage. C.B. Thomas collection.

The first 18 tramcars were converted from both redundant Sydney cable tram trailers and electric trams originally built during the 1890's. Included were 12 cable tram trailers that had run on the North Sydney or King St. cable tramways. From a number stamped in a panel above the internal sliding door, it is presumed that the saloon portion of the tramcar is former North Sydney cable tram trailer No. 18.³ This trailer was one of a batch of four trailers and two grip tramcars built by Benjamin Carne (Sydney) in 1891, with the order completed in January 1892.⁴

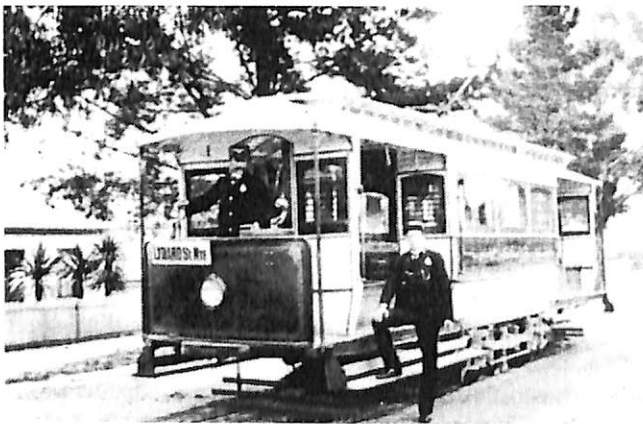


Figure 3 ESCo Ballarat 1, as No. 12 would have appeared upon entering service in August 1905. BTM Collection

Duncan & Fraser, Adelaide based tramcar builders, converted the bodies of these tramcars in Ballarat. (5) The saloon was placed on a longer underframe and the roof lengthened. The saloon window's spacings

were altered by converting the six window saloon portion to one of three windows. Driver's controls and longitudinal seats that could face either way were placed at both ends.

The tram was modified in 1913 for one man operation and fitted with windscreens. It worked in Ballarat until the mid 1930's. By that time the body was in poor condition due to its light weight construction and Ballarat's poor track. From 1930 secondhand trams from Melbourne replaced the 1905 trams, with No. 12 thought to be withdrawn from service in 1935. (6) The body was sold to a property owner in Nerrina, an old gold mining area to the north east of Ballarat, where it formed the basis of a house.

Museum members had known of the existence of the tram body for many years. They had approached the property owners on several occasions after they built a new house nearby, but to no avail. Their prime reason for not disposing of it was that the house would have to be acquired by the Road Construction Authority (RCA) as part of the Ballarat By-Pass.

One of the former open ends of the tramcar was used as a bathroom, with a wood chip heater built into the Driver's cab! Additional rooms were built on one side of the tram, leaving only one side and one end exposed to the weather. A separate roof was built over the tram roof itself, this action preserved the original roof.

Approaches were then made to the RCA, the predecessors to VicRoads, about the tramcar explaining its historical significance. The tram body was then promised to the Museum when the property was formally acquired. This step took some time and was only completed after the commencement of road construction.

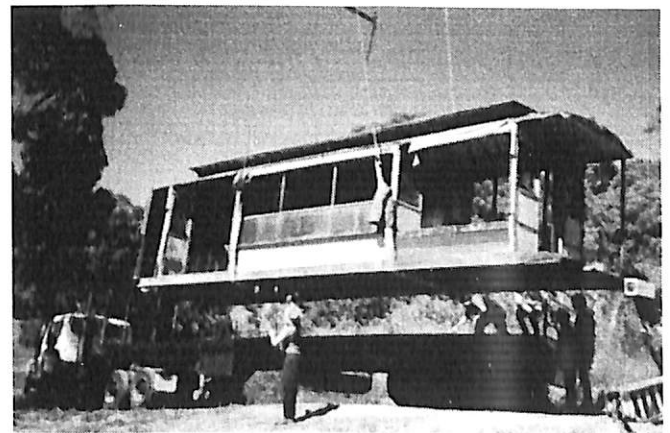


Figure 4 Loading No. 12 at Nerrina, near Ballarat, November 1990. VicRoads

In early November 1990, Museum personnel dismantled sufficient of the building that enveloped the tram to enable its recovery. The tram was lifted out of position on November 5, 1990. Following transport to the Museum's depot in Wendouree Parade, it was placed on lightweight bogies to enable its movement around the shed.

No 12 is believed to be the last survivor of the 18 ex Sydney tram bodies that pioneered electric tramway operation in Ballarat and gave the city an identity of being a modern world city. As such it is one of the few urban transport objects of the era that contributed to our National wealth.

2 THE PLAN

2.1 Research

The plan follows the *Engineering Heritage and Conservation Guidelines* of the Institute of Engineers of 1992. The Plan itself adopts the layout used by Whitmore of the Queensland Museum, in his paper *Researching and Conserving a Unique First World War German Tank*.⁷

The author, after attending the 1992 Hobart Conference, recommended the adoption of the Guidelines to the Museum Board and the development of a plan. One of the reasons for acceptance of the recommendation was for the Museum to improve its conservation practices and to ensure our collection maintains its cultural heritage. At the time of commencement, little work other than storing and just looking at the object had commenced, as the Museum was completing the reconstruction of the 1887 Horse Tram No. 1.

The research work for the background history of the tram itself, the social impact of the tramways on Ballarat and its operators has been done by the Museum's Historian, Alan Bradley. This work has been carried out over many years.

A detailed examination of the historical background of the tramcar placing it in the context of Ballarat's tramway history was prepared. These included its origins in Sydney as a cable tram trailer in 1892, its operating history, disposal, recovery, human factors, (crew, one man operation and passengers) and finally its impact on Ballarat. One element still missing from the background, despite extensive research of the technical literature of the time in the State Library and England, is the type of electrical equipment that was supplied with the tram itself. This is one of the few disappointments with the plan.

An analysis of the physical evidence and a review of problems, particularly caused by the lightly framed body, encountered in its operating history followed. After analysis of the evidence, a Statement of Significance was formulated.

2.2 The Statement of Significance

The determination of the significance of ESCo No. 12 derives from the definition of cultural significance of the Burra Charter, the evidence and its analysis.

- The body of No. 12 is a notable object having historical and technical significance as the only surviving example of a former Sydney cable tram body converted to a Ballarat electric tram.

- Being a tram body imported from another city amplifies the historical significance. Its conversion to another form of public transport vehicle and one of Victoria's earliest electric tramcars adds to this significance. The tram body shows the results of modifications, alterations, defects and some repairs during its nearly 30 year working life.
- The body has technical significance in that it shows how an older body underwent modifications to become an electric tramcar. It shows the stage of development, at the time, of an underframe for an electric tramcar in Australia. It also provides details of paint schemes used on the tramcars by ESCo, not accurately recorded previously. Even though the tram was poorly built, it served Ballarat for 30 years at a time when few people had cars and the population depended heavily on the trams.
- Diminishing the value of the tram's technical significance is the lack of any mechanical and electrical components, virtually complete deterioration of one side of the tramcar and some missing components.

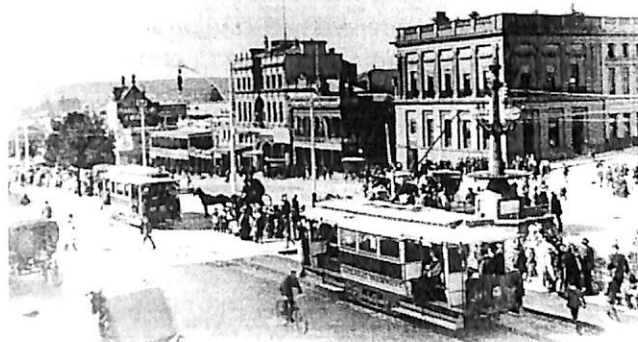


Figure 5 Electric trams enabled Ballarat to show that it was an important city within the Nation. Sturt St. 1905c. BTM Collection

- The social significance of the tram body is substantial in that it is one of the few reminders of early 20th century street public transport vehicles remaining. The trams brought a new and faster form of public transport to Ballarat. It showed that Ballarat itself was one of the modern cities of the world by having such electric tramcars.
- The social significance to Ballarat itself is also considerable in that it is one of the few components of the overall power supply system that ESCo provided to Ballarat in 1905 to actually survive. This system brought electricity to Ballarat residents and provided a more efficient public transport system than the then existing horse tram system. ESCo was itself of the era when electricity supply was privately funded and managed.
- Its social significance is important in that it is a reminder of the working conditions that tramway

crews had to work under and the related union battles. ESCo was the first to have one man operated electric trams in Australia.

2.3 Outcomes

The Statement of Significance shows that the tramcar has considerable heritage significance to Ballarat and its public transport history. It is worthy of expending resources on its conservation. However, given its heritage significance, should it be activated with the attendant problems that this brings? In determining this, a decision tree analysis that follows an outline of Conole and Hallet was prepared.⁸ Arising from this analysis came the following points regarding heritage, interpretive, safety and resource issues.

- Because the tram has heritage significance, considerable caution should be applied and assessment should be carried out;
- Activation will involve degradation of the existing fabric and possible loss of integrity and historical evidence;
- The parts can be fabricated, but a question is, how long can the activation be carried out for in the future?
- Activation should not be rejected, however the Museum should proceed with caution and review the assessment at regular intervals to ensure that this assessment remains valid.

The options for conservation considered were:

- Do nothing;
- Reconstruct to a non-operational state;
- Reconstruction to an operational state.

The latter option had a number of sub-options:

- What size truck or wheelset to fit?⁹ The museum had a longer truck than originally fitted, complete with motors.
- What braking system to fit? Originally fitted with hand and magnetic brakes. Today all our electric trams are air braked. However the frame would not be strong enough to mount an air compressor, tanks and brake cylinder onto.
- What era to reconstruct to? As built in 1905 without windscreens, or with windscreens. The fitting of windscreens was poorly executed and gave the trams a poor appearance.¹⁰
- Seating configuration? When built for Ballarat, the open platform seats were placed so that passengers could face outwards. This would not be safe in today's busier road traffic environment.

After consideration the following recommendations for display and interpretation were made:

- The tram body be re-constructed to the outward appearance of the 1905 configuration, that is no

windscreens. Seat bases to be installed into the 1905 locations with full length footboards. Pins to be provided so that the seat backs are fixed to face inwards during operation to maintain passenger safety but outwards when on static display.

- Handbrakes - and if possible, a magnetic braking system. (Electrical wiring configuration and installation should take this possibility into account during the reconstruction phase.)
- Truck - a six foot (1.83m) wheelbase truck be used in order to keep the same appearance and operational characteristics.
- Motors - if possible the same physical size in dimensions or smaller in physical dimensions should be used. The motors will be more powerful than the originals and these should be de-rated or wired in such a way that the power output is reduced.
- Destination sign - a four sided type destination indicator as fitted to the trams soon after its reconstruction to be made up and fitted.
- The physical operation of the tram in traffic should be limited to special days and specifically trained crews. The tram should be always manned by two trained drivers, to allow for relief in driving under handbraked conditions. The crew should be fully conversant with the history of the tram and be able to interpret the tramcar to the passengers.

2.4 The Research Continues

Since the completion of the draft document, further evidence came to light, which resulted in revisions and the review of photographs has shown the tram was fitted with swivelling trolley heads when built rather than fixed as we had originally presumed.¹¹ It is the minor details that continue to add life to the Plan and make it an evolving document.

The research work showed to us the significance of the tramcar with respect to the history of Ballarat's trams and to the social development of the city. As part of conserving our cultural heritage, a Conservation Plan was shown to be a valuable document.

3 BENEFITS

3.1 First Thoughts and influences

When it was first known that we would be acquiring the body, our initial thoughts were to have the tram fitted with a longer truck and air-brakes, primarily for operational reasons. These were altered after preparing the Plan and the realisation that we were dealing with a significant object, especially when we focused on the cultural heritage aspects. To fit these items would be almost totally out of place and very difficult to do without completely rebuilding the underframe. One of the significant parts of the object is its light weight underframe that shows a transition in design within Australia from that of horse or cable car trailers to later electric tramcars which have a much heavier frame.

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- What size truck or wheelset to fit?⁹ The museum had a longer truck than originally fitted, complete with motors.
- What braking system to fit? Originally fitted with hand and magnetic brakes. Today all our electric trams are air braked. However the frame would not be strong enough to mount an air compressor, tanks and brake cylinder onto.
- What era to reconstruct to? As built in 1905 without windscreens, or with windscreens. The fitting of windscreens was poorly executed and gave the trams a poor appearance.¹⁰
- Seating configuration? When built for Ballarat, the open platform seats were placed so that passengers could face outwards. This would not be safe in today's busier road traffic environment.

After consideration the following recommendations for display and interpretation were made:

- The tram body be re-constructed to the outward appearance of the 1905 configuration, that is no

windscreens. Seat bases to be installed into the 1905 locations with full length footboards. Pins to be provided so that the seat backs are fixed to face inwards during operation to maintain passenger safety but outwards when on static display.

- Handbrakes - and if possible, a magnetic braking system. (Electrical wiring configuration and installation should take this possibility into account during the reconstruction phase.)
- Truck - a six foot (1.83m) wheelbase truck be used in order to keep the same appearance and operational characteristics.
- Motors - if possible the same physical size in dimensions or smaller in physical dimensions should be used. The motors will be more powerful than the originals and these should be de-rated or wired in such a way that the power output is reduced.
- Destination sign - a four sided type destination indicator as fitted to the trams soon after its reconstruction to be made up and fitted.
- The physical operation of the tram in traffic should be limited to special days and specifically trained crews. The tram should be always manned by two trained drivers, to allow for relief in driving under handbraked conditions. The crew should be fully conversant with the history of the tram and be able to interpret the tramcar to the passengers.

2.4 The Research Continues

Since the completion of the draft document, further evidence came to light, which resulted in revisions and the review of photographs has shown the tram was fitted with swivelling trolley heads when built rather than fixed as we had originally presumed.¹¹ It is the minor details that continue to add life to the Plan and make it an evolving document.

The research work showed to us the significance of the tramcar with respect to the history of Ballarat's trams and to the social development of the city. As part of conserving our cultural heritage, a Conservation Plan was shown to be a valuable document.

3 BENEFITS

3.1 First Thoughts and influences

When it was first known that we would be acquiring the body, our initial thoughts were to have the tram fitted with a longer truck and air-brakes, primarily for operational reasons. These were altered after preparing the Plan and the realisation that we were dealing with a significant object, especially when we focused on the cultural heritage aspects. To fit these items would be almost totally out of place and very difficult to do without completely rebuilding the underframe. One of the significant parts of the object is its light weight underframe that shows a transition in design within Australia from that of horse or cable car trailers to later electric tramcars which have a much heavier frame.

Urban tramways played an important part in the development of our cities. Tramway museums have taken on the preservation of this part of our social history. As such we are responsible for this part of our Cultural Heritage. Our growth as a museum has been influenced by the Victorian Ministry for the Arts Museum Accreditation Program and documents such as the Institution's Heritage Guidelines. The research work undertaken looked at the cultural heritage of the tramcar itself, not just its nuts and bolts history but its social context as well. This latter part has been particularly influential in our decision making process.

3.2 Increases in Knowledge and Awareness

One of the major outcomes in the process of undertaking the plan was the improved knowledge of Ballarat's first electric trams and its operator, ESCo. The Museum members had a good working knowledge of the State Electricity Commission of Victoria (SEC) days, but very little of the ESCo era. The research we undertook kept raising questions, some of which could be answered by looking at the tram itself. The tram remains as one of the few links to Ballarat's first major electricity supplier.

To ensure that our tramway culture survives in an operable condition we must be aware of the process of conserving it and work hard at it. Make too many errors today we will not hand the heritage onto future generations to a standard that it could have been carried out to. This is not to say that we will not make mistakes, but hopefully we will be a lot more careful in our actions.

3.3 Advantages of Conservation Planning

As a result of undertaking the plan and preparing Conservation Planning documents in general, the Museum sees the following advantages:-

- get to know better the object you are looking after;
- determine its significance within your collection or care;
- examine options what can be done;
- following analysis determine what is the most appropriate option for conservation to be done, given the museum's circumstances and needs;
- detail what work is to be done and how it should be done;
- the precautions should be taken so that the loss of evidence of past practices is minimised;
- avoid mistakes that may have been made in the past by not undertaking such planning;
- allows comment by peers in the museum industry in general to be made;
- shows to others that you are aware of what you are doing;
- explain to non-museum or non-heritage people that conservation of our collection is important and that

changes to conform with their thoughts perhaps should not be undertaken lightly without proper consideration;

- hopefully be of assistance in obtaining funding for your projects by showing that you stand above others seeking the scarce dollars;
- show that our trams are of cultural significance and not "big boy's toys";
- we have a responsible attitude to the conservation of our collection for the future.

4 WORK TO DATE AND THE FUTURE

4.1 Work so far

So far the museum has reconstructed the underframe, replacing some timbers and keeping others, although with some additional steel plating to improve strength or to enable old timbers to be left into position. The steel plates introduced are finished to a different paint colour to the ones that were in position when we commenced work. It was obvious that these steel plates were not of 1905 origin either. At present the tram is positioned on two ex Melbourne bogie cable tram wheelsets of 1880's vintage which allow it to be moved around the depot building and also set upon stands to keep it square while work is done.

One side of the tram had almost completely rotted away due to weather exposure, while the other was still in a fair condition. The side framing on the first side, including the main corner posts have been completely renewed. On the other side, as much of the original timber will be retained as possible. Where necessary, splicing in new timber into the small sections or cutting in small pieces of timber in the corner posts which have been rotted out or deteriorated due to excessive number of screws etc. The roof of the tram is in reasonable condition and little of this will need to be rebuilt, other than being straightened.

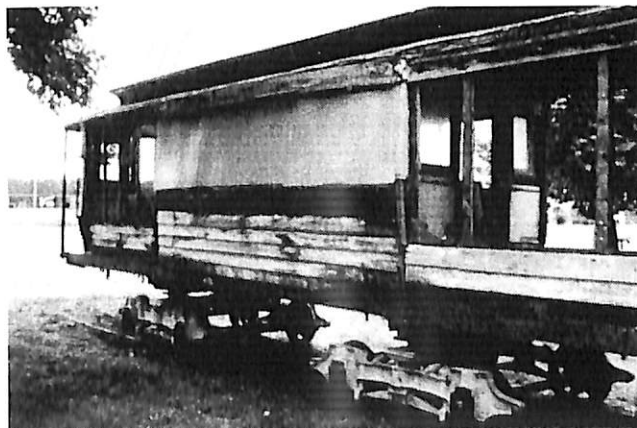


Figure 6 The side exposed to weather was rebuilt with weatherboards after the original timbers had almost completely rotted away. The tram body is mounted on ex Melbourne bogie cable tram trailer wheelsets. W.A. Doubleday

of the electrification of the trams in Ballarat. We are steadily progressing on the reconstruction task, with many other tasks being run in parallel, including the operation of the tramway, replacement of overhead trolley wire and other maintenance and conservation tasks.

4.2 Difficulties in Reconstruction

While photographs give good evidence of how the exterior of the tram appeared, there is little information on the interior as these and other fittings were removed. Some conjecture will be necessary here unless good photographs or information turns up. We have some good knowledge of the external seats and panels due to some panels and other pieces being found on the Nerrena property in sheds prior to demolition.

One of the other problems in “restorations” is recognition of weak points or poor parts in the original construction. One such problem was the mounting of the trolley pole on the roof of the tram. The original roof was not strong enough and bowed over years due to the load placed on the timbers by the springs contained within trolley pole mechanism. We have given some initial thoughts on building a look-a-like trolley base bridge to carry the loads out to the internal bulkheads and strong enough to carry the load itself without buckling.

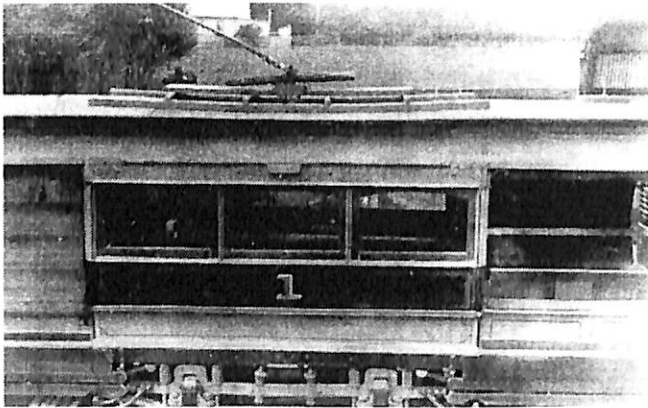


Figure 7 The stress associated with the trolley pole is evident in this photo taken in the early 1930's. SEC/BTM Collection.

4.3 The Equipment

Funding to build a new truck frame for the tram is at present being sought. The first stage will be to construct the side frames, the interconnecting members and then assemble the various parts. The Museum has a number of spare parts for brake rigging etc. Other parts will need to be cast and made up. The Bendigo Trust were given the patterns by the SEC after the closure of the tramways and they will be assisting us in the project. Motors and controllers will be of a more modern type which the museum has in store.

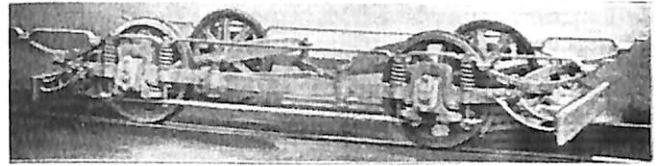


Figure 8 The type of wheelset to be placed under ESCo No. 12 is a Brill 21E, shown here without the motors.

4.4 Do it Again?

Would we prepare such a plan again? The answer is yes. The benefits that flowed from the process showed the advantages of it. Although it took a lot of work the outcomes were positive.

The Museum does not know of any such other comprehensive plan for the reconstruction of a tramcar within Australia. Other tramway museums have expressed interest in the process and it is hoped that more such work will be done in the future so as to conserve items of our urban transport cultural heritage that once contributed to the Wealth of the Nation.

5 CONCLUSION

Although preparing a Conservation Plan for a 1905 tramcar may seem to be another way of yet chopping more trees down. For the Museum it produced good benefits and in enhanced our understanding of what it is to be a Museum. Conservation Planning gave us a better understanding of the object that we have collected and the Museum's responsibility to conserve the tramcar body's cultural heritage. It enables this responsibility to be applied professionally to our collection and to conserve an item that once contributed to the development of Ballarat and the Nation.

REFERENCES AND NOTES

1. Kings KS. The Ballarat Tramways. Australian Railway Historical Society, Vic. Div., Melbourne, 1971:29.
2. Ibid:27.
3. North Sydney cable trailers had their saloon doors located in the centre of the bulkhead walls, while for the King St. trailers, doors were offset from one another. See Chinn N & McCarthy M. NSW tramcar handbook, 1861-1961, part two. South Pacific Electric Railway Co-Op Soc. Ltd., Sydney, 1976: 60- 63.
4. McCarthy K. North Sydney cable tramway centenary, trolley wire. April 1986:11.
5. Duncan & Fraser were an Adelaide based company that had built the horse trams for Ballarat

- in 1887 and were to build many electric tramcars for Adelaide, Ballarat, Bendigo and Melbourne.
6. Jack W. History of Ballarat tramways, 1887- 1953. Unpublished:9.
 7. Whitmore MG. Researching and conserving a unique First World War German tank. *Multi-Disciplinary Engineering Transactions*. June 1992;GE16(1):65-72.
 8. Conole L and Hallet M. Heritage artefacts, hands on, hands off? Activating heritage artefacts - the conservation and safety issues. *Scienceworks*, Melbourne 1993:36-38.
 9. A truck is the mechanical arrangement of the frames containing the wheels, motors and springing mechanism. A single truck tramcar is a four wheel tram. They were usually built by a contractor to a Brill (USA) design under licence in Australia.
 10. ESCo initially refused to install windscreens, but did so after an outcry from passengers forced to stand on open platforms in the rain while paying their fare to the driver.
 11. The trolley pole provides the electrical connection between the tram overhead wire and tram itself. It is sprung to accommodate the difference in wire height and turns on a central bearing when rounding curves. A swivelling trolley head allowed sharper changes in the trolley wire alignment to be made than in possible with the more Australian normal fixed head type, as seen on Melbourne trams still fitted with trolley poles. Generally single truck trams or four wheel trams were only fitted with one pole, which was turned at a terminus.