Re-tolling the bells - preservation of an historic bell tower

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Abstract. The Eveleigh Railway Workshops were the major locus of construction of steam locomotives in New South Wales, Australia, and the largest railway workshops in the Southern Hemisphere in their heyday. The site, located in the inner city suburb of Redfern in Sydney, operated from 1888-1988 and was then adapted into the Australian Technology Park (ATP), a commercial business park focused on innovative technology and research. A considerable amount of the preservation work on the site was, however, only half-done at the time of adaptation, and Extent Heritage spent much of the last ten years assisting the ATP management with backlog maintenance and preservation projects. One major incomplete project was the preservation of the bell tower on the former Works Managers' Office. A late 19th century rendered masonry building with later extensions, it is surmounted by a cast iron belfry with a bell that originally sounded the beginning and end of the work day at the site. Failure within the tower was causing major impacts within the building itself. Extent directed the project to conserve the bell tower and belfry, which required sympathetic modifications to the structure to address the practical conservation issues and manage the requirements for future maintenance and access. This paper will explore the issues uncovered and the techniques used to conserve the belfry and bell tower, and the decisions made to facilitate ease of future maintenace.

Keywords: conservation, bell tower, preservation, historic buildings, railway heritage.

1 Australia's railway heritage and site background

The development of steam railways in Australia, for passengers and freight, substantially commenced in the 1850s. At that time, New South Wales was a British colony and each of the colonies which later formed Australia took differing approaches to the development of their railway networks. In New South Wales, a major government railway building project commenced in 1855 and spread west from Sydney over the next several decades. Australia was a relatively isolated colony at the time, and thus the manufacture of the components of the railway network relied wherever possible on locally manufactured materials and equipment. By the 1880s, a major manufacturing facility was established at Redfern in New South Wales, only a few kilometers from the center of Sydney. This complex of workshops grew to become the largest steam locomotive manufacturing facility in the Southern Hemisphere, and management oversight of the facility was coordinated through the Works Managers' Office, surmounted by a belfry and bell which would signal the phases of the workday for the thousands of workers on site.

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1.1 The Eveleigh Railway Workshops

The Workshops were known collective as the Eveleigh Railway Workshops, and consisted of the Locomotive (or Loco) Workshops south of the rail line, and the Carriage Workshops to the north. These two major workshops were supported by dozens of smaller buildings containing specialized trades: wheelwrights, carpenters, painters, coppersmiths, locksmiths, etc. Steam locomotives ceased to be used commercially in Australia by the 1960s, and the Eveleigh Workshops became progressively obsolete, with a site which had once been one of the main manufacturing and trade hubs in Australia became redundant and finally shut down in 1986. While many buildings were demolished upon closure, others, including the Works Managers' Office, were retained and adaptively reused as the core buildings of the Australian Technology Park, a business park focused on technology and innovation. Unfortunately, not all of the adaptive reuse works were sensitive or thorough in terms of addressing conservation issues, which led to a decade-long program of backlog maintenance and conservation works between 2006 and 2015.

1.2. The Works Managers' Office

The Works Managers' Office was the administrative hub of the Eveleigh Workshops, and contained functions such as the Timekeeper and the Pay Office. Originally a modest building built circa 1886, it was substantially expanded in the 1920s and again in the 1940s (Fig. 1). The key element of the building was the bell tower, which served as both a visual landmark and the auditory marker for the progression of the work day. The building was constructed in a late Victorian style, two stories in brick with an ashlar-style render, metal roof and wraparound bullnose verandah with cast iron Corinthian columns and reused sections of railway ties as structural supports.

When the building was converted into the International Business Centre in the early 1990s the interiors were substantially stripped out, changing the internal layout of many of the rooms and either removing or concealing historic fabric. At that time the building was airconditioned, and all original windows and doors were replaced with modern aluminium non-openable equivalents. Externally, aside from the windows and doors, there was minimal change to the building's form and appearance, although there was also little conservation and maintenance work undertaken either.

From the mid-2000s, the site management changed and with it came a new philosophy and understanding of the value of the site's heritage. By this time, the suburb of Redfern had become a desirable inner-city location to live and work, and is less than 10 minutes' train ride from the centre of the city. Based on this proximity and ensuing demand, the site management was seeking premium rents for the buildings, and came to realise that the site's heritage was not a liability, but was an important point of difference and part of what was keeping demand for office space, and thus rental prices at the site, high. Over a period of nearly ten years, a series of major and minor conservation projects were undertaken across the site; one project which was long on the list was the conservation of the bell tower on the Works Managers' Office. The conservation works to this structure finally took place in 2015, a year before the site was sold into private hands.

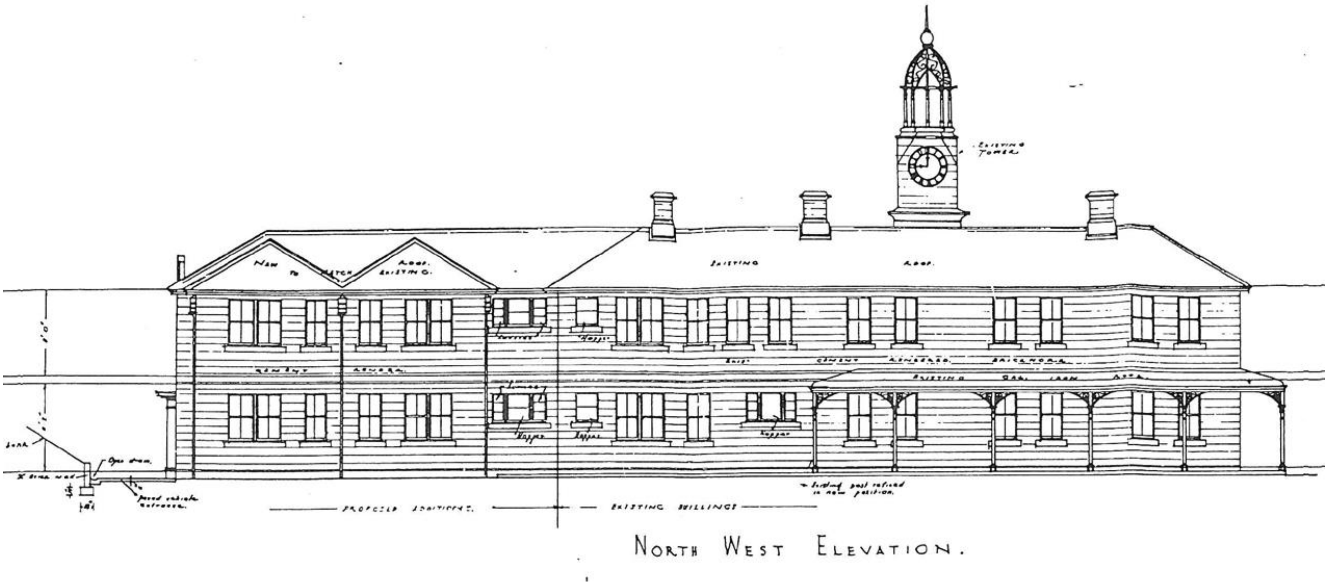

Figure 1. North West Elevation, 1944. : Department of Railways NSW, Ways and Works Branch. Eveleigh Works Manager's Office Additions, Plan No. 102-146, dated 23 March 1944

2 Site analysis and survey

The site was initially surveyed by structural engineers and a heritage architect to determine the key elements of failure within the bell tower. This process was challenging due to the very limited access provided to the bell tower, a further challenge which required rectification to facilitate future maintenance (Fig. 2). While no fundamental structural problems were identified, there was clear evidence of water ingress to the bell tower, and a series of makeshift internal gutters which had previously been put in place were not adequate to deal with the water. Furthermore, the top of the tower was capped with a wrought iron plate which had serious issues with decay, and was causing rust jacking to areas of the masonry. Above this iron plate was the belfry itself, a cast iron openwork structure which stood a further 2 metres above the top of the tower and was bolted into the masonry. Perimeter drains through the belfry structure were inadequate and blocked, allowing water to pond within the base of the belfry. The belfry also supported the bell, in a fixed position, with a pair of iron clappers which had previously been operated by pull ropes leading through the cast iron plate and into the bell tower itself (Fig. 3).

On further analysis, there was evidence the bell had been turned in the past, as the clapper marks appeared in two locations on opposite sides of the bell, and an historic photo suggested the bell had been taken down at some point in the mid-20th century. Uncommonly, the bell was of steel rather than bronze, a late 19th century innovation to supply inexpensive bells, exported from England. The bell was held in position with badly rusted mild steel hasps.

It became clear that the top of the bell tower would need to be rebuilt, with minor repairs needed to the uppermost sections of masonry and, ideally, a replacement for the wrought iron plate which provided the top of the bell tower. To achieve this, however, it became necessary to completely remove the cast iron belfry from the top of the structure, which presented a whole series of challenges.

Research had identified the belfry as a relatively standard cast iron element which had been available in Australia as a catalog item, exported from England in pieces and assembled on site. The belfry is supported by 8 decorative iron columns, and it was determined that the structure was tied down to the roof via a series of iron tie rods inserted through the columns and bolted through a decorative cast iron kerb set into the roof (Figs. 4 and 5).

2.2 The conservation works

A rigging firm was engaged to secure the belfry to allow it to be lifted off of the bell tower via crane, in one piece, if possible. The bolts securing the structure had to be split, as most were rusted fast to the interior tie rods within the cast iron columns. After loosening of these fastenings, the crane was able to lift the belfry free of the tower in one piece, to allow it to be inspected and transported off site for conservation.

Once down, inspection revealed the quality of the casting was very poor. The castings had deep pits throughout the surface of many key elements, which had not held paint well and served as reservoirs for water, promoting rust. As the element was meant to be viewed from a distance, it was clear that there was no care for the fine details taken in the original manufacture of the belfry. The belfry was coated in remnants of lead paint, and the wrought iron tie rods were in poor condition. Otherwise, the belfry was complete and intact, with very little loss of fabric and was able to be fully disassembled to its original components for transport to the facility where it was stripped of existing paint and repainted.

Following the removal of the paint, a decision was made to fill the pits left in the casting using an epoxy resin. The team debated the merits of this approach, as it was effectively not reversible, however it was decided in conjunction with the client that filling in the pits was the best option to ensure the element effectively repelled water and would take a good coat of paint. Given it had been 40 or more years since the element was last painted, and it could only be effectively painted in future with great difficulty, a pragmatic decision was made to reduce the need for future maintenance and thereby protect the structure, despite the lack of reversibility of the technique. From the ground, the change was invisible and, in the view of the team, was an acceptable compromise as it would improve the longevity of the structure.

Further minor modifications were required to the belfry to reinstate it. The structure was successfully disassembled, allowing it to be painted in a zinc rich primer and then painted with a two pac epoxy paint, which would provide the greatest longevity, again due to the difficulty with future maintenance. The cast iron tie rods within each column were however not suitable for reuse, and were replaced with stainless steel tie rods and new stainless-steel fixings. In general, where required, all fixings were replaced with stainless steel. The lightening rod atop the belfry was also repaired in copper.

Figure 2. The belfry and tower prior to conservation (The author 2014)

Figure 3. The base of the belfry, prior to removal. Note the clapper mechanism, and the circular cap was the maintenance access point. (Long Blackledge Architects 2014)

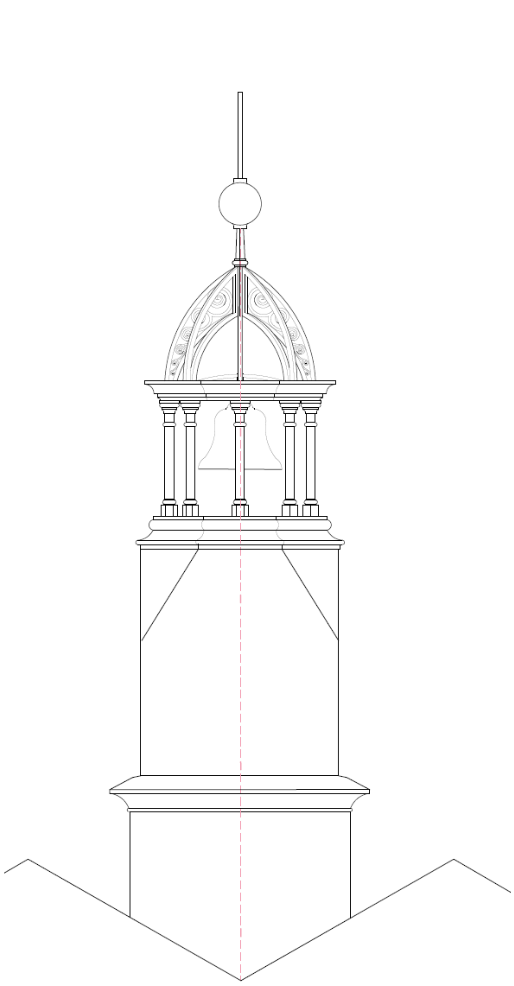

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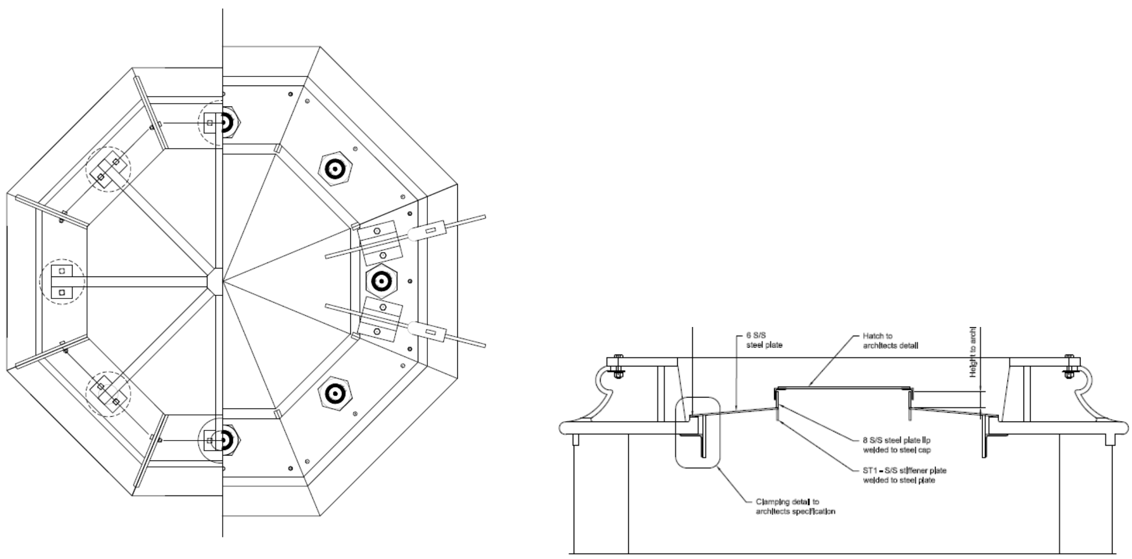
Figure 4. Elevation and cross section of the bell tower (Long Blackledge Architects 2014).



Figures 5 A (top) and B (bottom). Plan and cross-section of the belfry base, showing the attachment arrangement for the cast iron belfry (Long Blackledge Architects 2014).

While the belfry was being treated and conserved off-site, work proceeded on the bell tower itself. The cast iron kerb around the edge of the tower was retained in situ, with the existing perimeter drains cleared and improved as far as possible, given their limited diameter. As the kerb was cast iron, re-drilling the drains to a greater diameter was deemed impractical, due to the risk of cracking the cast iron elements. The kerb was primed and repainted in situ. The wrought iron plate which served as the roof of the tower was also removed at this time, and proved to be beyond repair. The surrounding brickwork was repaired, as were the internal drains in the tower, to deal with the inevitable future water ingress. Access was also improved into the tower at this time by the insertion of stainless steel ladders internal to the tower, to facilitate safe future access. The wrought iron roof piece was ultimately replaced by a segmented stainless-steel roof piece, which was slightly conical in cross section, to facilitate the shedding of water and incorporated a new access hatch. The clapper system was rehabilitated in situ and the pull ropes replaced with braided stainless-steel cables, capped at roof level to again improve water resistance.

2.3 The bell

The bell used in this building was unusual, in that it was a steel bell, rather than bronze, manufactured by Naylor Vickers and Co of Sheffield England. Research determined these were a short-lived English innovation in the late 19th century, to try and create a cheaper bell product for export. At the time, the Naylor Vickers steel bells were a third the cost and half the weight of an equivalent bronze bell. Approximately 750 of these bells have been identified throughout the world, with the greatest numbers in the UK, USA and Australia. The bell itself was generally in good condition, and was designed to be fixed in position and hit by a pair of clappers operated from below via ropes. The bell had also been painted at an unknown point in the mid- to late-20th century.

The bell required little in the way of repair, other than the replacement of the rusted fixing hasps, which were replaced in stainless steel. The paint was removed, and the bell painted to match the belfry. This was again a pragmatic decision due to the difficulty of future maintenance access, as well as the fact that the clappers (which would damage the paint) were likely to be used very infrequently. The bell was then reinstated within the repainted and reassembled belfry, ready for reinstallation.

2.4 Reinstatement of the belfry

Following the repairs to the bell tower, the belfry was ready for reinstallation. Again, the structure was rigged up to allow it to be craned into position in one unit and fixed into place. The reinstallation, while slow and careful, did happen with no problems. The conserved belfry was lowered into place, and secured to the top of the bell tower using the new stainless-steel tie rods and stainless-steel fixings, and tightened down using a torque wrench to the tightness specified by the structural engineers. Following the reinstallation, the final works consisted of touchup painting, attaching the new stainless-steel cables to the clappers and the attachment of the earthing cable to the lightening rod. Internally to the building, the plasterboard ceiling which had been damaged due to water ingress through the bell tower was removed, and the original timber lining boards were exposed and painted. Opportunity was also taken to flash over four disused chimneys at this time, which were a further source of water ingress to the building.

3. Conclusions

The conservation of the bell tower on the former Works Manager's Office was the final stage of a program of conservation works throughout the Australian Technology Park site which had proceeded in stages over a decade. While it was undertaken within the context of the impending sale of the site to the private sector, and was driven in part by the desire to remove a contingent liability from the balance sheet, the results were a high quality, enduring conservation job on a site element that was primarily viewed for its aesthetic value only, and had suffered from long-term neglect. The conservation works reinstated this highly visible element of the site to a sound, functional condition, as well as improving the operational performance of the underlying building and its modern use as commercial offices. What our long association with this site demonstrated was that site owners who may be skeptical or reluctant to undertake conservation works can be persuaded over time to undertake such works to provide a commercial point-of-difference for their site, as well as to lessen their maintenance requirements and financial liabilities. This tripartite approach to the rationale for undertaking the works proved most effective in achieving the site owners' requirements for the place while undertaking sound conservation works which will endure for many years to come.

3. Acknowledgments

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