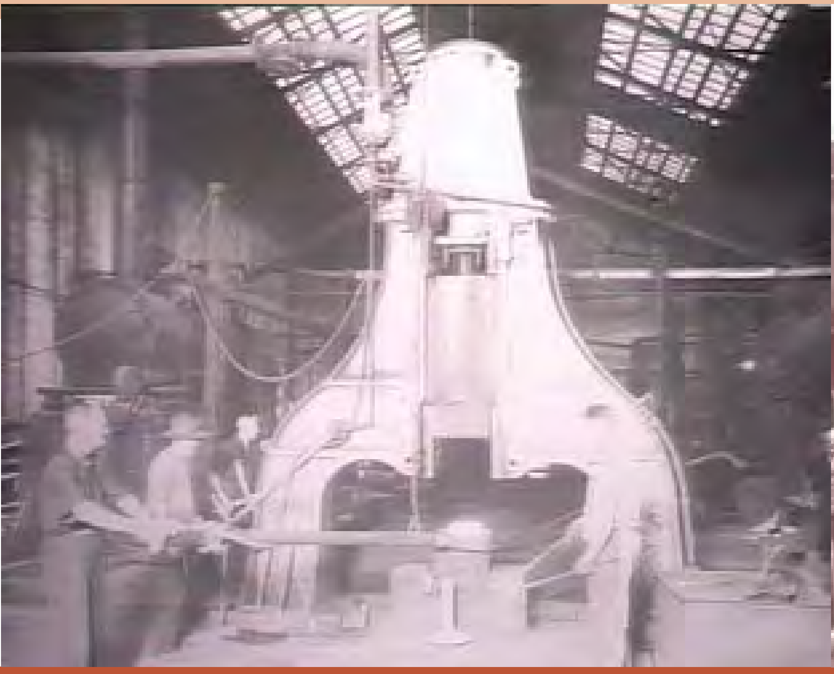
EVELEIGH LOCOMOTIVE WORKSHOPS

CONSERVATION MANAGEMENT PLAN

VOLUME I



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1 EXECUTIVE SUMMARY

The Eveleigh Locomotive Workshops building, built in 1887 and closed in 1988, operated as part of a large complex of railway workshops now considered to be one of the best surviving examples of their kind in the world.

This report examines the history of the Eveleigh Locomotive Workshops and its extant building fabric to arrive at a statement of heritage significance from which conservation policies and strategies are developed. The report is supported by an inventory of building fabric. It builds on the Conservation Management Plan prepared for the site by the Heritage Group, Department of Public Works and Services (DPWS) in 1995.

The place is of outstanding heritage significance on international, national, state, and local levels. The outstanding value of the Locomotive Workshops is dependent on the value of the place as a whole and in particular with its operating machinery. Few, if any, workshops of the late 19th Century, and of this size and quality, survive with operating machinery. The value of the machinery depends on the survival of systems, especially hydraulic and steam assemblages and collections. The loss of any of the parts diminishes the value of the whole. Additionally, the international significance and outstanding character of the place is enhanced when the place is considered in combination with the Carriage Workshops also known as North Eveleigh Railway Workshops.

Detailed levels of significance are ascribed. The general conservation policy recommends the retention of heritage significance in accordance with the principals of the Burra Charter (revised 1999). Such conservation should be achieved through minimal intervention with *maintenance* being the single most important conservation process. It is imperative that the internal spaces be conserved, that is, the grand industrial spaces that visually define workshops and factories of this era and size, and the design of which is generated by the overhead travelling cranes. Bays 1 - 2 of the building should be *conserved* in total. As Bays 10 –14 retain their large volumes with minimal changes in terms of modern fitout, new uses in these bays should not obstruct the space unduly and not impact on the original fabric. For instance, using “demountables” to accommodate offices is an appropriate fitout type as they were traditionally used in the workshops. Demountables can also be made secure, are not permanent and do not require intervention of the building fabric to install.

The remainder of the building is robust and has been adaptively re-used within the conserved building envelope.

The policies are developed in detail for implementing and managing conservation of the place, conserving the fabric, enhancing the cultural identity and undertaking new work. Detailed policies have been developed for treatment of the building fabric and machinery.

The Constraints and Opportunities are analysed and provide a basis for the development of a strategy for implementation of the conservation policies. The most important of these are management structures and issues, including funding, to ensure the implementation of the conservation plan. It is recommended that Bays 1- 2 be conserved as an operating workshop.

Initial works carried out from 1996 to adapt the place for new uses included stormwater collection and disposal and some building fabric conservation. Further work is required to conserve the building fabric, in particular the stonework, which was not conserved in the previous works. Detailed recommendations are being developed by Roger Parris for some of the machinery in a separate project undertaken concurrently with the preparation of this Conservation Management Plan.

A building fabric inventory is being completed as part of the Conservation Management Plan and provides direct detailed guidance for documentation and incorporates significance and conservation policies. A “Carer’s Guide” is also being developed to provide key information about conservation of the place for users.

The report develops performance standards for further adaptive reuse. A range of future uses is possible and such uses should preserve the significant aspects of the place such as the large volumes and industrial character. Examples provide models for further conservation and development of the Eveleigh Locomotive Workshops.

2. INTRODUCTION

2.1 AIMS OF THE REPORT

This Conservation Management Plan (CMP) has been commissioned by the Sydney Harbour Foreshore Authority (SHFA). It has been prepared by Otto Cserhalmi + Partners PL (OC+P) in 2002. It is Volume I of a three volume set. Volume II being the "Site Inventory" and Volume III "The Carers' Guide".

The CMP aims to be a practical document for the Eveleigh Locomotive Workshop to guide decisions which may affect the heritage values of the place. It will comprise one of the bases for future planning and provide a standard against which to assess the heritage impact of proposed developments. It should be used when planning development of proposals and when carrying out activities in the place.

The Australian ICOMOS Charter for the Conservation of Places of Cultural Significance (Burra Charter 1999) provides the Australia-wide accepted guidelines for heritage conservation. Section 2.0 (Conservation & Management) of the charter states:

> *2.1* *Places of* cultural significance *should be preserved*
>
> *2.2* *The aim of* conservation *is to retain the* cultural significance *of a* place
>
> *2.3* Conservation *is an integral part of good management of* places *of* cultural significance
>
> *2.4* *Places of* cultural significance *should be safeguarded and not put at risk or left in a vulnerable state.*

The NSW Heritage Council requires a Conservation Management Plan to be prepared for each item listed on the State Heritage Register. Once endorsed by the Heritage Council, this document will form the basis of exemptions from requirements to obtain approvals under Section 60 of the Heritage Act 1977.

The aim of this Conservation Management Plan, therefore, is to set out:

- The cultural significance of the place
- Policies appropriate to enable the cultural significance of the place to be retained in any future development and conservation work.

- Strategies for implementing these policies.

2.2 SITE AND OWNERSHIP

Location and Physical Context

The Eveleigh Railway Workshops are located in the inner city immediately to the south of Sydney's CBD and Central Station. The workshops are situated on either side of the main southern and western rail lines and between Redfern, Erskineville and Macdonaldtown Stations and between the suburbs of Darlington to the north and Alexandria to the south. The immediate surroundings contain densely developed residential suburbs and mixed commercial and industrial areas. The site is relatively flat, falling to the south-east towards Botany Bay and Mascot.

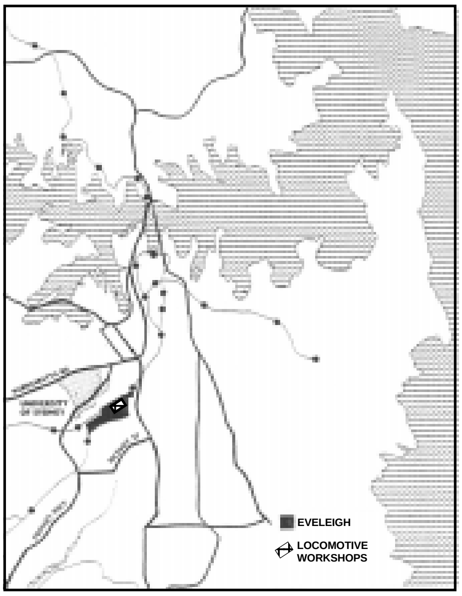


Figure 1.1: Plan showing the location of the site.

The subject of this report is the Eveleigh Locomotive Workshops (ELW) building which is located on the southern side of, and adjacent to the main rail lines. This report is limited to the building but refers also to its immediate setting. The ELW building is on a long level bench with a major step down on its southern side.

The site of the ELW building was the Alexandria Goods Yard and has been extensively cleared since 1988. Below it, along its southern boundary is the tunnel for the Eastern Suburbs Railway. Immediately to the east is an open area, Innovation Plaza, and to the east of this is the National Innovation Centre (former New Engine Shop) and to the north-east the former Works Manager's Office. To the west are a roadway, the traverser and the large Erecting Shed and other buildings used by the State Rail Authority (SRA).

This report does not address Innovation Plaza (to the east), nor the lines to the north (all recently relaid with altered levels) or the coal structures and bomb shelters close to the main lines.

Ownership and Usage

The building was in continuous use as a railway workshop until its closure in 1988 and in continuous State Government ownership since its construction in 1887. The Sydney Harbour Foreshore Authority (SHFA) assumed control of the site from the City West Development Corporation (CWDC) in August 2000. The SRA still retain other portions of the Eveleigh Railway Workshops in their ownership.

The Australian Technology Park now occupies the Locomotive Workshops and other parts of the site. The surrounding land includes an area that was developed for

KEY to photographs

1. Former Carriage Shed
2. Gasworks
3. Former Engine Running Shed
4. Former Alexandria Goods Yard
5. Former Foundry
6. Locomotive Workshops
7. Paint Workshops
8. Carriage Workshops
9. New Engine Workshops
10. Works Managers Office
11. Large Erecting Shed

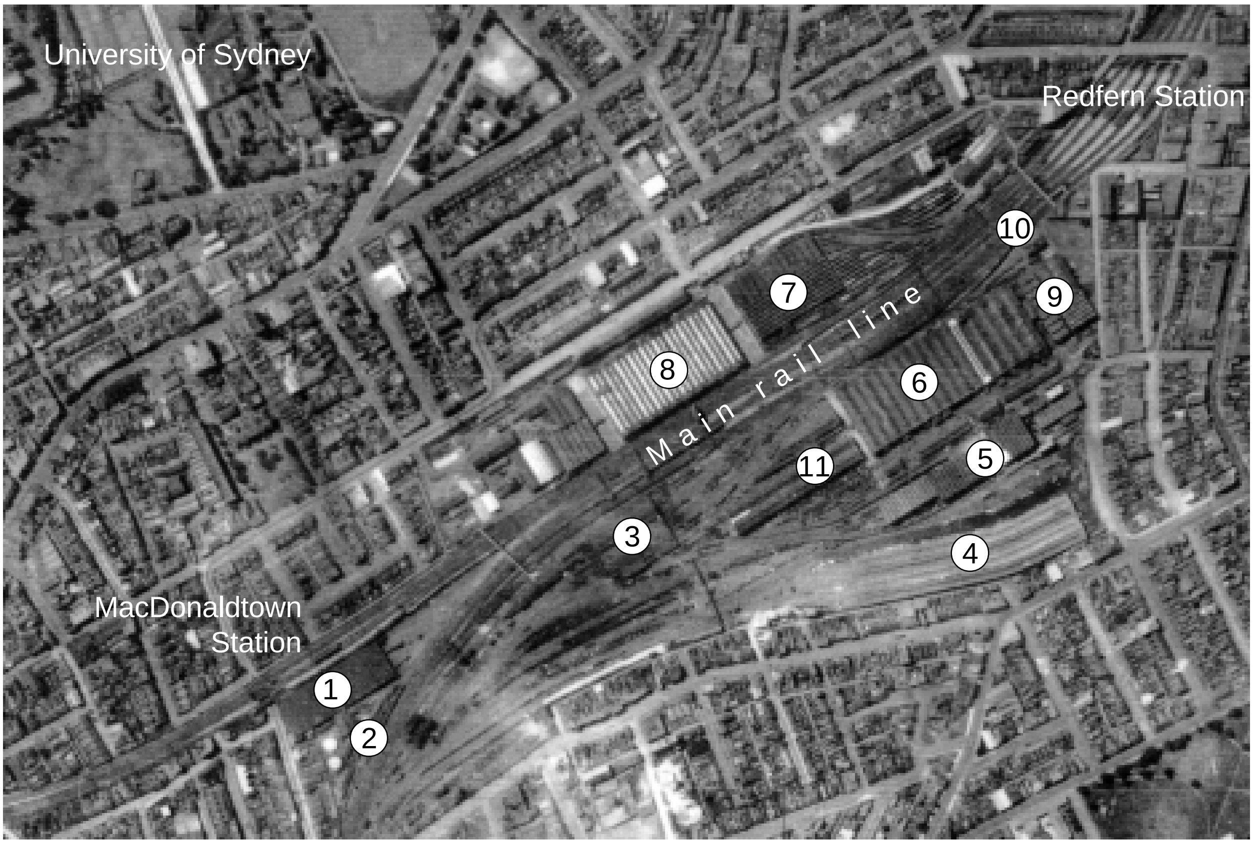


Figure 1.2: 1930 aerial photograph of the Eveleigh Railway Yards showing items referred to in this report. Some items now demolished are shown in this photograph.

Figure 1.3: 2002 aerial photograph of the Eveleigh Railway Yards showing items referred to in this report. Some items in the key have been demolished and are not shown.

housing in the late 1980s and is managed by the Department of Housing.

2.3 SCOPE OF THE REPORT

This report sets out the cultural significance of the Locomotive Workshops developed by analysing the physical fabric and its history. The Statement of Significance is intended to be one of the bases of future planning on the site. General conservation policies have been developed for the building. The condition of the building has been assessed and strategies for implementing the policies developed.

Comments - The Conservation Management Plan needs to be endorsed by all those involved with the management of the site. Comments of the Sydney Harbour Foreshore Authority have been incorporated. Comments are also to be obtained from the NSW Heritage Office.

Inventory – A detailed physical analysis of the building was undertaken and presented in the form of an inventory in 1995. The second phase of the inventory was undertaken in 2002 and documents the existing condition of the building with a record of completed and required maintenance.

Research - Additional historical research has been carried out for this report including an oral and social history component. Information has been incorporated from other recent reports and an Aboriginal history consultant engaged. Some plans have been located at the State Records NSW (formerly Archives Office) and photographed for use in the report. Many plans are lacking because they have recently been transferred from State Rail to NSW State Records and at present are not archived appropriately. The fragile state of many of the originals has meant that those that they cannot be readily copied. Administrative and managerial information has been obtained and incorporated into the appropriate section of the report. An operational history is included, as this is crucial in understanding the significance of the place.

2.4 METHODOLOGY AND STRUCTURE

This report follows the general structure and methodology as set out in J. S. Kerr's *The Conservation Plan*, National Trust of Australia (NSW) 1991. It is consistent with the guidelines as set out in *The Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (the Burra Charter)* 1999.

This report is the primary working document. It contains summaries of, and references to, more extensive research material and statements and policies contained in other reports.

The inventory that accompanies this report provides the information necessary when considering works to each item.

2.5 TERMINOLOGY AND ABBREVIATIONS

2.5.1 Describing the Building

The Eveleigh Railway Workshops have been the subject of a number of reports and studies, historically as well as recently. The extant structure was originally two buildings and the bay numbers began at the eastern end. Bays 1 - 4 were separated by a gap from Bays 5-15. Bays 16 - 25 continued at the Carriage Workshops on the northern side of the main line. In 1903 the gap between Bays 4 and 5 was enclosed and this bay was numbered 4a. In c.1998 the bays were renumbered and Bay 4a became Bay 5 and Bays 5-15 became Bays 6-16. Note that the renumbering has resulted in two Bay 16s. As a consequence, some inconsistencies in terms, bay numbers and rows exist between reports. In order to retain consistency and for ease of cross referencing between historical and modern references the following system has been used in this CMP:

Eveleigh Railway Workshops -refers to the whole of the original workshops site on both sides of the main line. That is, the Locomotive as well as the Carriage Workshops sites. In other sources, the site has been referred to as the "Eveleigh Railyards" and the "Eveleigh Rail Yards".

Locomotive Workshops - refers to the entire building, original Bays 1-15, present Bays 1-16 on the southern side of the main line.

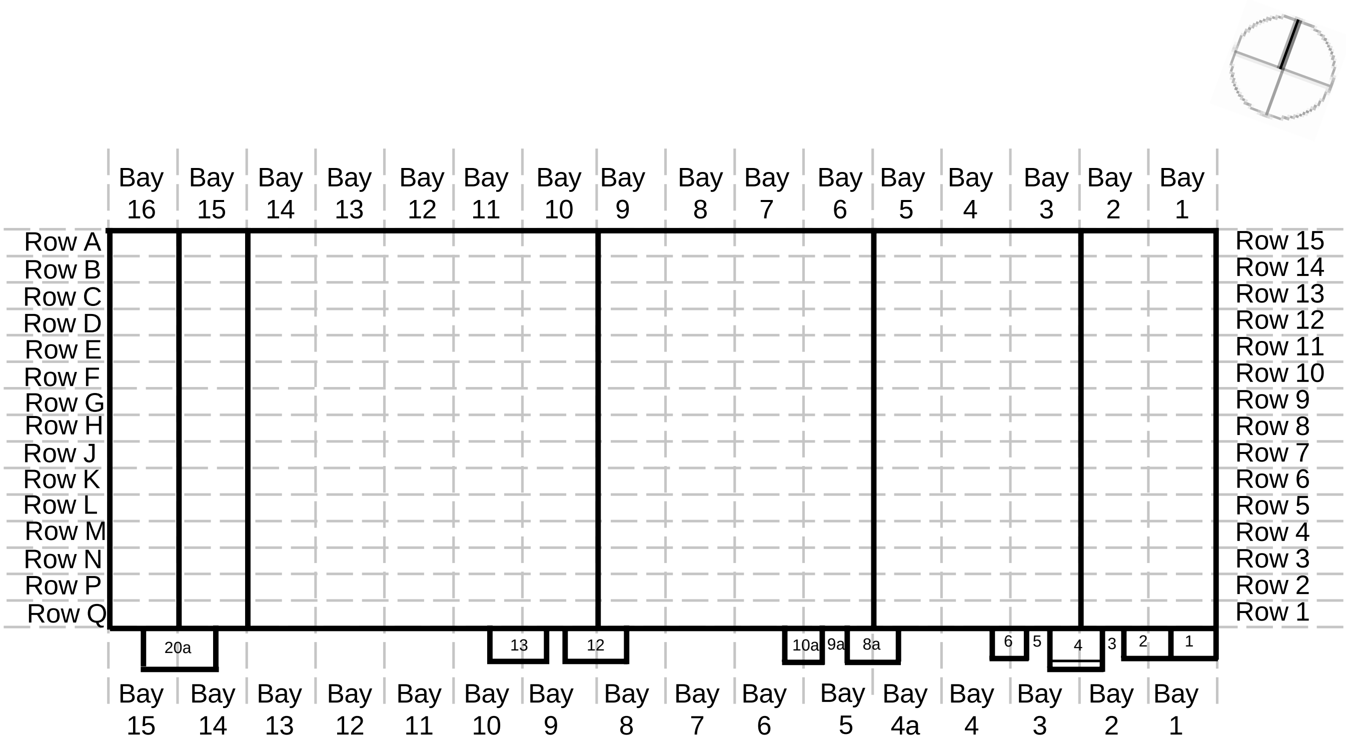
Carriage Workshops - refers to the former Carriage and Wagon workshop Bays 16 - 25 (most recently the Suburban Car Workshop) on the northern side of the main line.

Bays - Structurally, the Locomotive Workshops building is divided transversely into bays. Bays 1 - 4, 4a, 5 - 15 - refers to the original bay numbers. This system is used in the *Historical Analysis* to facilitate references to historic plans and other documents. Bays 1 - 16 - refers to the modern bay numbering system at the Locomotive Workshop building. These bay numbers are used in the *Policies* with the old bay numbers in brackets.

Rows - Structurally, the workshops building is divided longitudinally into rows. Some rows have rails and some do not.

Rows 1 -15 - The original Railways row identification system is 1 - 15 with Row 1 starting at the southern wall.

Rows A - Q - More recently, the Department of Public Works and Services identified the Rows as A - Q (excluding the



letters I and O) starting at the northern wall.

Annexes on the south wall are numbered from right to left. The missing numbers have been demolished.

2.5.2 Conservation Terminology

The terms *place, cultural significance, fabric, maintenance, compatible use, preservation, reconstruction, restoration, adaptation* and *conservation* used throughout this report are as defined in the *Australia ICOMOS Charter for the Conservation of Places of Cultural Significance ("The Burra Charter")* 1999, Article 1.0 to 1.17.

1.1 Place *means site, area, land, landscape, building or other works, group of buildings or other works, and may include components, contents, spaces and views.*

1.2 Cultural Significance *means aesthetic, historic, scientific, social or spiritual value for past, present or future generations. Cultural significance is embodied in the* place *itself, its* fabric, setting, use, associations, meanings*, records,* related places and related objects. *Places may have a range of values for different individuals or groups.*

1.3 Fabric *means all the physical material of the* place *including components, fixtures, contents and objects.*

1.4 Conservation means *all the processes of looking after a* place *so as to retain its* cultural significance.

1.5 Maintenance *means the continuous protective care of the fabric and* setting *of a* place*, and is to be distinguished from repair. Repair involves* restoration *or* reconstruction.

1.6 Preservation *means maintaining the* fabric *of a* place *in its existing state and retarding deterioration.*

1.7 Restoration *means returning the existing* fabric *of a* place *to a known earlier state by removing accretions or by reassembling existing components without the introduction of new material.*

1.8 Reconstruction *means returning a* place *to a known earlier state and is distinguished from* restoration *by the introduction of new materials into the* fabric.

1.9 Adaptation *means modifying a* place *to suit the existing* use *or a proposed uses.*

1.10 Use *means the functions of a place, as well as the activities and practices that may occur at the place.*

1.11 Compatible Use *means a use which respects the* cultural significance *of a* place*. Such use involves no, or minimal impact, on cultural significance.*

1.12 Setting *means the area around a* place*, which may include the visual catchment.*

1.13 Related place *means a place that contributes to the* cultural significance *of another place.*

1.14 Related object *means an object that contributes to the* cultural significance *of a* place*, but is not that place.*

1.15 Associations *mean the special connections that exist between people and a* place*.*

1.16 Meanings *denote what a place signifies, indicates, evokes or expresses*.

1.17 Interpretation *means all the ways of presenting the* cultural significance *of a* place*.*

2.5.3 Railway Terminology

The following terms and names particular to railways, railway workshops, carriages and wagons have been included to clarify the descriptions of the Carriage Workshops, their operation and functions. Refer also to Sections 3.5.1, 3.5.2 and 3.5.3.

Blacksmith The workshop in which all the metal trades were housed but predominantly where iron and steel was forged. The Blacksmith's workshop held steam hammers, pneumatic hammers, a guillotine, electric shears and numerous other tools for working metal.

Bogie A device located towards the end of a carriage which can swivel independently to follow curves in the railway lines. It consists of a frame supported by wheels (in NSW either four or six) and carries sets of springs to soften and control the ride, ride control levers or springs, brake equipment linked to the brake cylinder and other equipment associated with the safe operation of the car.

Brake-Van A vehicle (originally the last on a train) which contained hand operated brakes and provided space for the guard. Before continuous air-brakes were fitted, the only brakes on a train were those on the engine and in the brake-van. These vans also carried luggage, parcels, newspapers, mail and other matter requiring passenger train transit. Sometimes, the brake equipment was included in a passenger carriage, in a separate part at one end.

Car or Carriage Synonymous for a vehicle which conveys passengers, their related baggage, mail and parcels.

'Suburban' Carriages This term refers to carriages which were mainly used in the Sydney, Newcastle and Wollongong suburban areas. The first 'suburban' carriages were the 'American' cars (refer description below).

'Express' Carriages Timber bodied non-corridor cars with separate compartments accessible from either side of the train. These carriages were built from the 1890s and many were converted to corridor cars in the 1930s. Named after the 'express' routes on which they travelled.

'American' Carriages Timber bodied, central aisle, end platform carriages which were introduced to the NSW railway system from the 1870s. These carriages were based on American designs. Approximately 200 of these cars were converted for electric use in the 1920s.

'Tourist' Carriages These carriages were former 'American' cars which had been fitted with internal partitions and toilets in the 1930s. They were used on short distance 'tourist' routes such as those to the Blue Mountains, Newcastle and Wollongong.

Coaching Vehicles Railway vehicles designed to carry passengers and their related belongings, which are designed and built to be hauled at passenger train speeds.

Dive A short, subterranean rail tunnel where one railway line passes under another so that the movement of trains in either direction is not impeded. An example is the 'Engine Dive' which runs from the locomotive side of the tracks at Redfern. It passes under ten running railway lines and emerges on the opposite side of Redfern station where it joins the up main line.

Forge A furnace in which metal is heated before shaping by beating or hammering.

Foundry The workshop in which molten metal is poured into moulds.

Head Shunt A short line of railway, usually with a buffer stop at the end, where vehicles can be taken during a shunting operation. The siding adjacent to the Telegraph Workshop is the main head shunt at Eveleigh allowing vehicles to be moved to different lines on the fan of rails, or apron, adjacent to the paint shop.

Interlocking The name given to the apparatus which works the protective signals at a site. It includes equipment to avoid conflicting movements. A signal-box is part of the equipment.

'Main Line' Carriages were intended for long distance and/

or overnight travel, as distinct to carriages used on short distances i.e. suburban operations. When referring to the Eveleigh site, the term refers to a series of about 180 locally designed vestibule carriages, many of which were built at the Eveleigh Carriage and Wagon Workshops.

Pattern Timber model or template of items to be cast in metal. The patterns were pressed into sand to form the shape of the item for casting.

Perway Also known as Permanent Way. The track of a railway line; the ballast, sleepers and rails. This term distinguished it from that laid temporarily during construction by the contractor for ferrying materials along the length of the works.

Rail Motor A self-propelled coaching vehicle which is propelled by a built in internal combustion engine.

Run Round Track A section of rail line parallel, or close to, a receiving or passing line and laid out so that an engine (with or without vehicles attached) can detach from one end of a set of vehicles and pass beside those vehicles and be attached to the opposite end of the vehicles usually to draw the vehicles back in the opposite direction to that in which they arrived.

Traverser A platform or framework to which a length of rails are attached and which moves locomotives, wagons and carriages transversely along rails. Such a device is sometimes constructed outside a wide locomotive-shed so that a locomotive entering from a single approach track can move onto the traverser and then be moved sideways to line up with any one of the shed lines.

Trimming The upholstery inside a carriage including head rests, squabs (seat backs), cushions (seats), armrests or any other item inside a carriage designed or required for passenger comfort.

Wag(g)on Describes a vehicle designed for conveying freight or goods traffic, or related to that type of business. The spelling changed early this century. Wagons were overhauled at the Eveleigh Carriage and Wagon Shops until the 1909-13 period when a new works was built for wagon repairs at Clyde Sidings and they were removed from the Eveleigh site.

Works Vehicle A storage van, work or mess van, open truck or any other purpose which is related to construction or maintenance of the railway lines and haulage of supplies e.g. coal. Good examples are sets of redundant passenger cars, which were gutted and used in installing and maintaining overhead wiring for new electrified lines.

Wrought Metal fashioned or formed by beating with a hammer.

2.5.4 Abbreviations

AO	NSW State Records (formerly Archives Office)
ATPPM	Australian Technology Park Precinct Management PTY LTD
ATPSL	Australian Technology Park Sydney Limited
BC	Better Cities Program
CMP	Conservation Management Plan
CWDC	City West Development Corporation
DOP	Planning New South Wales (formerly Department of Planning)
DPWS	Department of Public Works and Services
ELW	Eveleigh Locomotive Workshops
EP	Eveleigh Precinct
HOff	NSW Heritage Office
ICOMOS	International Council on Monuments and Sites
LEP	Local Environment Plan
MP	Master Plan
ML	Mitchell Library
NSW SR	NSW State Records
SHFA	Sydney Harbour Foreshore Authority
REP	Regional Environment Plan
SRA	State Rail Authority
SRAO	State Rail Archives Office
SSCC	South Sydney City Council
SSHS	South Sydney Heritage Study
UDP	Urban Development Plan

2.6 CONTRIBUTORS AND ACKNOWLEDGMENTS

This report was prepared by the Otto Cserhalmi + Partners Pty. Ltd. The project team consisted of:

Jean Rice	conservation architect
Istvan Czehmester	architect for building fabric survey.

Pamela Kottaras	researcher/archaeologist	
Ruth Daniell	conservation architect	SRA
Susie Hoppe	heritage planner	Jeffrey Campbell
Laila Haglund	cultural heritage consultant	Michael Logue

Assistance was provided by:

ATP	SHFA
Eugene Besh	Adrienne Cray
Richard Davies	Wayne Johnson
Maria Evans	Ian Kelly
Stephen Montgomery	
Matthew Woodman	

Allen Madden	Cultural Education Officer of the Metropolitan Aboriginal Land Council provided advice.
David Sheedy	Architect
Lucy Taksa	University of New South Wales.

Commentary
Ian Kelly, Adrienne Cray and Wayne Johnson commented on behalf SHFA. Cameron White commented on behalf of the Heritage Office.

2.7 CONSTRAINTS AND LIMITATIONS

The primary constraint on this report was the difficulty in accessing the historic plans for the Eveleigh Railway Yards, currently being recatalogued after transferral from the State Rail Authority archives to NSW State Records.

2.8 FURTHER RESEARCH

There is potential for further research into the social and technological history at Eveleigh. Some will be carried out during forthcoming studies on the social history of the Eveleigh yards and on the moveable items and relics. Input from an industrial archaeologist would be useful to provide insight into the possible subterranean layout of the site. Some of the areas suggested below have been addressed but further work is desirable. These areas include:

- A search of Railway Archives which are now held in the NSW State Records
- Railway archives are reputed to have held 16mm film taken at Eveleigh in the 1940's, which would reveal historical information and may be invaluable for

interpretation. The film should now be held at the NSW Archives Office.

- Other railway records for contract documents or orders for materials or plant.
- Plans for minor and recent alterations by the Railways or by Paddy's Market to establish a detailed sequence of development.
- Research into the records of various unions with responsibilities at the site. The ARU is known to have some material related to Eveleigh.
- The relationship of this and other similar buildings to contemporaneous buildings overseas.
- The operation and history of each machine. In particular when work is contemplated to that machine or interpretation is being developed.
- Research with former workers who operated machines to provide operational information and stories associated with machines.

This Plan, in particular the Statement of Significance and Conservation Policy should be reviewed in the light of any further research.

REVIEW OF EXISTING RESEARCH

Numerous published books & reports relate to the railways and to Eveleigh, and are referenced in the Bibliography. The reports that were used extensively in preparing this report and synopses follow;

***Eveleigh Workshops Management Plan for Moveable Items and Social History, Volume I*, Godden Mackay, 1996.**
Part of a six-volume set of reports commissioned by City West Development Corporation, State Rail Authority and the Department of Urban Affairs and Planning (now PlanningNSW). The machinery at the Eveleigh Locomotive Workshops is reviewed, assessed on heritage criteria and catalogued. Conservation policies for the machinery are also included in this volume of the report.

***Eveleigh Workshops Management Plan for Moveable Items and Social History, Volume II*, Lucy Taksa, 1996.**
Part of a six-volume set of reports commissioned by City

West Development Corporation, State Rail Authority and the Department of Urban Affairs and Planning (now PlanningNSW). A social history of the Eveleigh Railway Workshops, using oral histories collected for Volume V of the same project.

***Eveleigh Workshops Management Plan for Moveable Items and Social History, Volume V*, Godden Mackay, 1996.**
Part of a six-volume set of reports commissioned by City West Development Corporation, State Rail Authority and the Department of Urban Affairs and Planning (now PlanningNSW). This volume contains the transcripts of the oral histories collected for the project.

***South Sydney Heritage Study Volume 2 – Historical Material,* Tropman & Tropman, 1995**
Compiled by Rosemary Annable and Kenneth Cable, this document is a collection of plans, maps, themes and historical notes on South Sydney. Although this volume is detailed, it is not comprehensive.

***Investigation of Drains*, A & A, 1994**
Includes video inspection of stormwater lines and recommends replacement.

***Eveleigh Precinct Social Impact Study,* Brian Elton & Associates, 1994**
Examination of the projected impact of the ATP development on the surrounding community. It includes a description and analysis of the profile of the existing community and community structures and consultation with community representatives and South Sydney Council.

***Master Plan And Urban Development Plan,* Keys Young & CWDC, 1994**

***Electrical Services Assessment,* Ove Arup, 1994**
Identifies hazardous areas and recommends disconnection of services.

***Condition Assessment,* Rice Daubney, 1994**
Identifies extensive problems and recommends extensive works. No analysis in relation to significance.

***Conservation Policy,* Schwager Brooks, 1994**
This report was based on information contained in the heritage study and did not involve historical research, or revision of the statement of significance. The report relates to the whole of the site and develops general policies and recommendations. Specific recommendations are made for the Locomotive Workshops. These are summarised in Section 7.

The report was written for the NSW Department of Planning while the site was owned by the SRA. These policies should be reviewed in the light of change of ownership and the lease of sections of the site. The policies should be amended if necessary & adopted by new owners and lessees.

Relics Policy, **Don Godden, 1988**
Outlines the significance of relics, assemblages, collections and systems after movement of items in Bays 4a - 15. Recommends conservation procedures and catalogues relocated relics.

Eveleigh Railway Workshops Heritage Study, **Godden, Mackay and Associates, 1986**
This report was written in 1986 while the workshops were still in operation. The bulk of the report identifies machinery and buildings that are of heritage significance. The report contains a history of the workshops. This was not called for in the commission but was found necessary to identify items of significance. It was the most thorough history of the site for its time but did not include research into all known sources. The report includes a statement of significance for the whole site that now needs revision in the light of the closure of the workshops. This report catalogues the machinery in its 1986 locations. There is an inventory page for each machine.

Structural Report, **McBean and Crisp, 1985**
Identifies the same structural concerns and overall condition as evident in 1995.

Geotechnical Investigation, **Gutteridge Haskins & Davey (n.d)**
General assessment indicating conditions but inadequate to indicate whether or not the soil conditions are the cause of damage to bays 1 - 4a or the reason for the differences in the foundation design.

Ground Contamination, **Johnstone (n.d)**
Indicates the nature of contamination in some areas of Locomotive Workshops.

Other Reports
A large range of reports has been written in relation to the Eveleigh Planning Precinct and some about the surrounding area. Those that have been accessed have been listed here with a brief note about their relevance to the Locomotive Workshop. Many other reports have not been viewed because of difficulty in gaining access and time limitations, e.g. the extensive reports done by postgraduate university students.

3. HISTORICAL ANALYSIS

3.1 GEOLOGY AND GEOGRAPHY

The former Eveleigh Locomotive Workshops site sits on Ashfield Shale, which is part of the *Wianamatta Shale Group* consisting of dark-grey to black siltstone, through to fine grained sandstone laminite. The shale ranges from 48 to 54 metres deep across the Sydney area and includes most of South Sydney. In some areas, layers of clay varying in depth from 1.5m to 7.0m top the shale (CH2M 2000: 6).

The land comprising the Eveleigh Railway Workshops site was mostly on the Shea's Creek catchment to the south that drained into the low-lying Botany swamps via the Cooks River and thence to Botany Bay (DPWS 2000:16). The higher land at north Eveleigh, around Wilson Street drained in a north-easterly direction via Blackwattle Swamp Creek to Blackwattle Bay (Tropman & Tropman 1995: 379; Kelly and Crocker 1978: 1850's Parish Maps Alexandria and Petersham: 24-25 in Haglund 2001). The drainage patterns were a major influence on the area's early industrial development.

Development has by now obliterated original land surfaces and their vegetation, but a picture can be reconstructed (Benson *et al* 1990: 66). An extensive sheet of wind-blown dune sands covers the sandstone between Moore Park and Bunnerong and there are estuarine silts and clays along Shea's Creek. Eastern Suburbs Banksia Scrub with its rich assemblage of species including plants much valued by Aborigines (e.g. Banksia species and grass trees), once covered much of the sand and provided habitats for small game. Between the dunes there were small fresh water soaks and areas of swamp forming wetlands with sedges, paperbarks and bottlebrushes. The area may not have been all that good for camping because of damp and mosquitoes, but it would have been an important resource to the local Aboriginal people and was probably much visited (Haglund 2001: draft).

The land developed for the Railway Workshops, Chisholm's grant, is shown on a detail of a pre 1855 parish map of Petersham. There is a low-lying swampy area on the southern boundary at the eastern end of Chisholm's grant. Other swampy areas are shown to the south of the King land grant, draining into Shea's Creek.

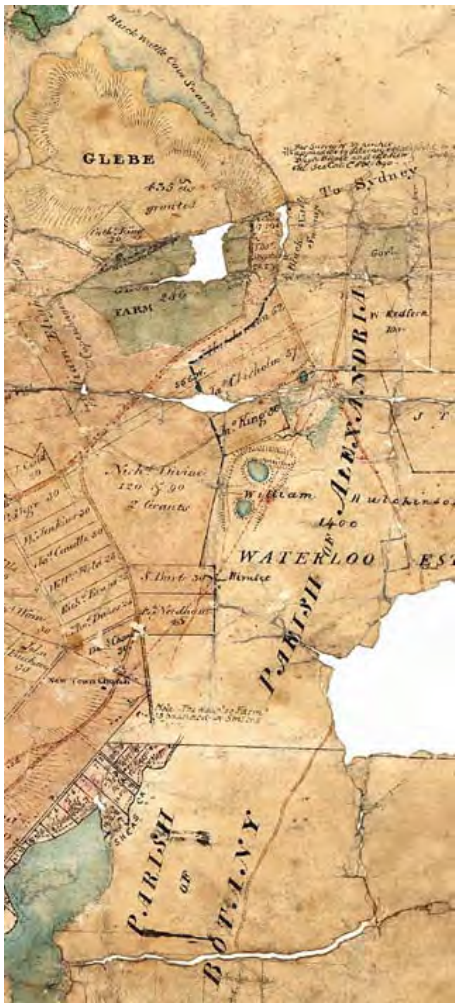


Figure 3.1: The swampy nature of the area is shown in this detail of a Parish Map of Petersham, pre 1855. Source: ISSN 1441-6352 Volume PMAPMN04, Parish Maps CD, County of Cumberland, Parish of Petersham, 14062201, AO Map No. 341 is written on the image.

3.2 ABORIGINAL HISTORY

Aborigines have been present in the Sydney region at least since the peak of the last glaciation some 20,000 years ago. At this time, the sea was about 25km east of Sydney. As ice sheets started melting and draining into the oceans, the rising sea level slowly encroached on the coastal margins and by 6,000 years ago Sydney Harbour had reached its present size and shape. It then gradually developed a stable environment rich in fish and shellfish.

The arms of Sydney Harbour are separated by sandstone ridges and plateaux. Sandstone areas carried heath, low woodland and open forest with swamp sedge in poorly drained parts and pockets of rain forest in sheltered and damp gullies. Where decaying shale covered the sandstone, there could be dense forest. Edible plants were particularly common in moisture rich areas. Fire, lit by either nature or humans, helped shape both vegetation and ground surfaces below. However, if left unburnt even the poorest soil was soon covered in shrubs and woody plants.

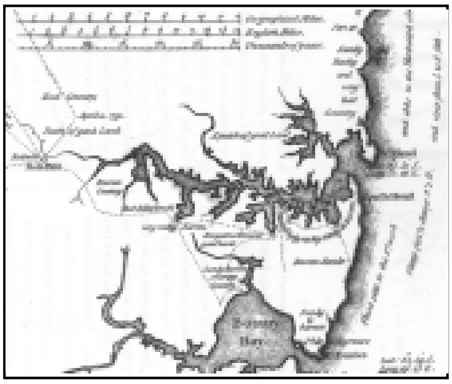


Figure 3.2: Detail of a 1791-2 engraving by J. Walker based on a map in the journal of Captain John Hunter. It shows a track or route leading from Sydney Cove to the south where the land is described as ‘barren sands’. Source: Ashton *et al* 2000: 11.

Fire was an important multi-purpose tool to Aborigines who used it for cooking and warmth and to modify the environment to better suit their needs. For instance, burning off was probably carried out to enable easier access between Port Jackson and Botany Bay and early views of the Sydney area show open grassland dotted with trees on most headlands and islands giving it a park-like appearance. A 1791 map shows early tracks to the eastern suburbs, Botany Bay and Parramatta, and these probably followed existing Aboriginal tracks.

Figure 3.3: Aboriginal language groups in the Sydney area. Source: Kleinert *et al* 2000: inside cover.

Although Aborigines have had a long presence in Sydney, information about their history before the arrival of the First Fleet in 1788 is largely embedded in physical traces of their activities.

The ‘Sydney language’ or “Eora” was spoken to the south of Port Jackson. Careful studies are rediscovering much of the Eora language and history and tracing the reminiscences of old people (Haglund 1996:132-139).

Prior to 1788, this land was occupied by members of the Cadigal tribe, part of the Eora nation (Allen Madden pers. comm., 2001) who probably had a long tradition behind them.

Etheridge (1896) examined excavations for “Shea’s Creek Canal” through a tidal swamp and described important observations of sections fifteen feet deep. He saw traces of a submerged forest (of genera not growing below high tide) interpreted as likely to derive from a period of lower sea level; bones of a dugong showing cut marks, apparently of human origin; and three “tomahawks” or ground-edged stone hatchet heads of undoubted Aboriginal origin. He argued his interpretations carefully and quoted detailed supporting evidence.

Kohen (1993:25-26) quotes William Dawes who recorded the Aboriginal names for food plants in the Sydney region. These plants included berries, e.g. geebungs, native cherry, lilly pilli, five corners, native raspberry, native passionfruit, native grapes, native currents, native orange, native mulberry, figs and kangaroo apple; and flowers with much honey, e.g. some Banksia, Waratah, Grevillea and Melaleuca species. Seeds, shoots, stems, nectar and the leaves of some plants were also eaten. In addition, many plants were used for a variety of practical purposes: string could be made from kurrajong, but also from the bark of hibiscus and native figs. Other plants were used to make baskets. Paperbark was used for many things including wraps for children. Resin was used as an adhesive, particularly that from the grass tree (Xanthorrhoea sp.), which was once common in the area. The grass tree flower stalk could also be tipped with a hardwood point and used for a spear. Burls on three trunks were scooped out to form dishes (See also Smith 2001: 127-129).

A starchy but bland component of the diet was derived from fern roots or various tubers and roots, which were roasted and pulped and at times flavoured with mashed ants or herbs (Turbet 1989: 67-68).

The foundation of Sydney Town, the rapid spread of British rule and smallpox drastically changed traditional patterns. Smallpox had killed about half of the Aboriginal population around Port Jackson by 1791. Some clans disappeared and although the Cadigal were at one stage, greatly reduced, Aborigines as a population, did not disappear (Haglund 2001: 2). Names of past social groupings are remembered, as well as traditions about their organisation and territory.

3.3 EARLY DEVELOPMENT

The land to the north of the Eveleigh Railway Workshops drained to Blackwattle Swamp Creek, which was a major influence on its early development. The land to the south, and the site itself drained to the Shea's Creek catchment. Prior to closer settlement it was the province of escapees and runaways.

John Fitzgerald, *one of seven men…involved in robberies at Long Cove, Blackwattle Swamp and Vaucluse Farm* (Williams 1998: "J") in 1805, is but one of the "bushrangers" named as having associations with the place. State Records of New South Wales name a Henry Dawkins in 1822 as Overseer of the Blackwattle Swamp Gang, a workgroup employed to begin reclaiming the area.

The geography of the area meant that the facilities for water supply and effluent output was sufficient for heavy industry, which the area attracted. After an Act was passed in 1848 banning some noxious trades within the city, many practices moved just outside the boundary to where a dam at Shea's Creek provided water for wool washers, tanneries and boiling down works. An abattoir operated in Blackwattle swamp from 1835 to 1860 towards the eastern end of the swamp, and was one of many industries that contributed to the overall polluted state of the local waterways. By 1877, Shea's Creek had been named by the Sydney City and Suburban Sewage and Health Board as one of the polluted waterways responsible for causing an "unusual amount of sickness and death" (State Records, NSWa: 1) and was eventually built into the Alexandra Canal.

The area to the north and east of Eveleigh was subdivided and developed for residences by the mid 1850s while Eveleigh was still farms. In the 1830s and 1840s grants were divided into middle class villa estates, gardens and farmyards.

Dr William Redfern was granted 100 acres to the east of Eveleigh in 1817. He may not have lived here. In 1834, after his death, the land was offered for lease as 2-5 acre lots considered suitable for the erection of genteel cottages or for those occupied in gardening.

Early land grants near the Eveleigh site were to Hutchinson (1819), Chisholm (1835), King (1794), Chippendale (1819) and Shepherd (1827), but there was little development on any of these sites until the late 1870s.

In this section the original Bay numbers are used, 1-4, 4a and 5-15

Figure 3.4:The Burrowes 1840s map of the Parish of Petersham, showing the location of the Hutchinson (1), Chisholm (2) and King (3) estates, outlined. Source: ML ZM2 811.182/1840/1

Thomas Shepherd's grant of 28.5 acres was to the north west of Eveleigh and here he established his Darling Nursery which was later run by his widow and subdivided from 1855.

Hutchinson's grant was immediately north of Eveleigh. It was 52 acres and was granted in 1819. He was a convict who went on to become a public servant, prominent citizen, landowner and businessman. He died in 1846 and the area is said to have been leased for gardens. This continued until its subdivision into the Golden Grove Estate from 1881. This subdivision of the site into small lots was intended to attract the 'working man' and the major phase of building was between 1888 and 1893.

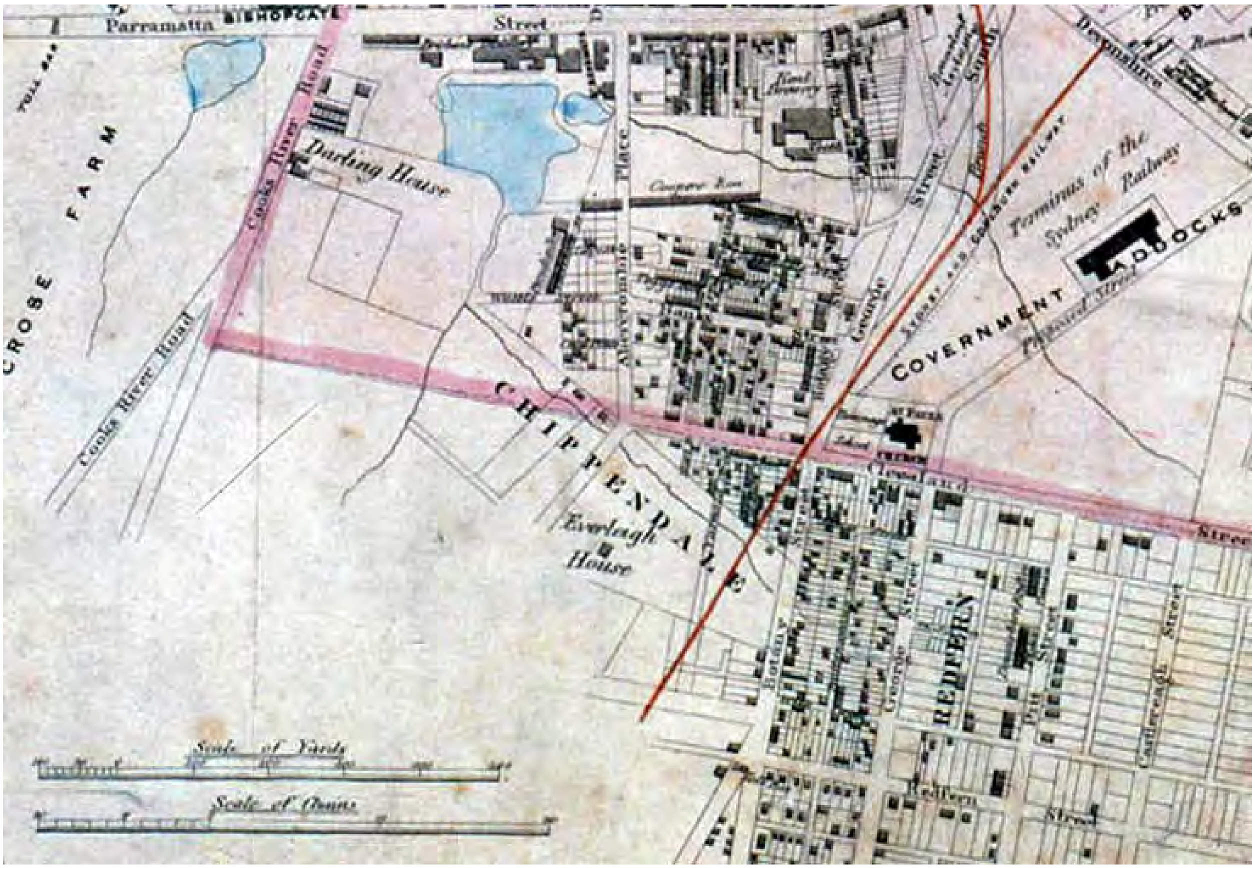


Figure 3.5: Detail of Woolcott and Clarke's 1854 map of the city of Sydney showing the location of Eveleigh house (centre). Source: ML ZM2 811.17/1854/1.

The area further to the north of Eveleigh was granted to William Chippendale in 1819 but he sold it in 1821 to Levey. The southern part of this grant was purchased in 1844 by William Hutchinson and the area became known as Hutchinson's paddock. It was known for its watercress beds and was largely paddocks. The northern part of Chippendale's grant was named after him and the area was by the 1850s at the limits of the city of Sydney. It was occupied by the working class, living within walking distance of workplaces such as the breweries and distillery.

It was on part of the site acquired from Levey that one of Hutchinson's sons-in-law, John Rose Holden, built 'Everleigh House' (later written Eveleigh) after his mother's maiden name. It is believed that the house was constructed in about 1840 Eveleigh House was located in the area of the present Aboriginal Housing Company, and its land was subdivided gradually through the 1860s and 1870s eventually giving its name to the surrounding area. Hutchinson also had very extensive holdings in Waterloo (1400 acres), to the south of Eveleigh.

King's grant to the south of Eveleigh was known as Kingsclear and its main occupant in the late 19th century was Henderson's plant nursery. Residential subdivision began in the late 1870's.

Figure 3.6: Woolcott & Clarke's map of the City of Sydney, 1854. Source: ML ZM2 811.17/1854/1.

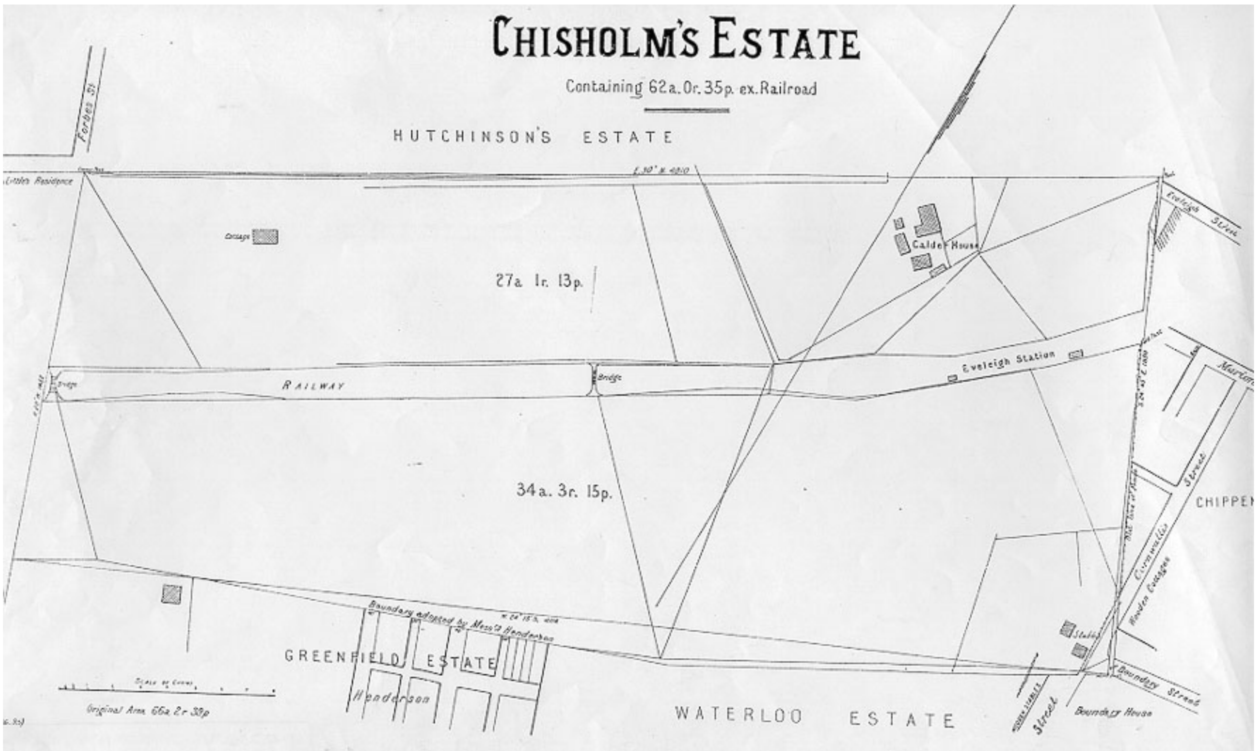


Figure 3.7: Chisholm's Estate. This plan shows Chisholm's land when it was resumed for the Eveleigh Railyards including his house, the main line bisecting the property, Eveleigh Station and a bridge over the rail line linking the two parts of his property. Source: SRAO EL 1.

The Eveleigh site itself was originally granted to John Davis in 1794 but this was cancelled. In 1835 the site of 62 acres was granted to James Chisholm who was born at Calder, Midlothian, Scotland in 1770 and arrived in Sydney in 1790 with the NSW Corps. On his grant, Chisholm erected 'Calder House'. The date of the house is uncertain, with various sources suggesting it was built c. 1820, in 1823, 1824 and in the late 1830s. Chisholm died in 1837 and the house was presumably complete by this date. His widow lived in the house until 1855. It is shown on the 1855 plan drawn when part of Chisholm's grant was resumed for the railway (Fig:3.7). At this time the construction of the new railway cut Chisholm's grant in half and the house was effectively cut off from the remainder of the land. It was leased as a school to Mr Castle and taken over in 1865 by Dr Sly who operated Dr Sly's Academy until the site was resumed by the railways in 1878.

Figure 3.8: Calder House at the Redfern Station end of Wilson Street. It housed the managers of the Eveleigh Railway workshops and burnt down in 1921. Note that the etching below is identified as Calder House also although it appears to be a different building. Source: Sharpe 1999: 78.

Calder house was used for several years, at least between 1916 and 1921, as a residence for the Locomotive Works Manager of the Eveleigh Railway Workshops. In 1923, it burnt down and its remains were demolished in 1924. An SRA Plan Room index card, sighted in 1995, referred to Mr Howe's residence and is notated "*formerly Calder House*". The plan, however, could not be located.

Figure 3.9: Calder House in 1921. Etching by Sydney Ure Smith. It is not known whether these illustrations are of the same building or not. It is conceivable that the building could have been altered from the vernacular form to the upper Victorian form but this would mean the date of this etching is wrong. Source:ML PXN 670, DG* D43

In the latter half of the nineteenth century the area which is today South Sydney, was on the whole, peopled by the working classes employed in local industry, was very polluted and had a significantly high crime rate.

Later improvements in rail and tram transport systems created a network as far as St. Peters and Marrickville in which working class residences were built within the vicinity of industry. When the same transport networks extended further south, the middle classes were able to move away from the city and the disease bearing *miasmas* therein.

The archaeological report prepared for part of the ATP site concluded that the level of ground disturbance has left little evidence of the 1835-1880 phase of occupation. Calder House was spared because of its location at the north of the site and at a higher level. The residential occupation of the later nineteenth century and "the cutting and filling carried out for railway purposes is likely to have disturbed and/or destroyed that evidence leaving, at best, fragmentary features and deposits" (Thorpe 1994: 16). It may therefore be inferred also that little evidence of pre-contact Aboriginal occupation would remain on the site.

Figure 3.10: The 1855 rail line bisecting Chisholm's estate is shown on this detail of a Parish Map of Petersham, c1855-60. The property has not yet been purchased for the railyards. Source: ISSN 1441-6352 Volume PMAPMN04, Parish Maps CD, County of Cumberland, Parish of Petersham, 14072901, written on the map is AO Map 262

Figure 3.11: 1889 Higinbotham and Robinson map of Redfern in the Parishes of Alexandria and Petersham. The "Eveleigh Railway Yards" are shown. Eveleigh Railway Station, later to become Redfern, is to the north-east of the workshop area. Calder House is in the centre of the map. Source: ML ZM3 811.1819/1889/1 Sh1(2).

The site for the Eveleigh Railway Workshops (Chisholm's grant) was chosen in 1875, and the estate, by this time reduced to 10 acres, was resumed in 1878 with the compensation price settled in 1880. Clearance began two years later and development continued into the 1890's. The first Eveleigh Railway Station was built in about 1876 in the centre of todays Eveleigh site in the approximate location of the Illawarra Dive. In c.1886-87, the second Eveleigh Station (the current Redfern Station) was built further to the north east. It was re-named Redfern Station in 1906 when the new Sydney Terminal (the current Sydney/Central Station) was completed.

The residential development of the area proceeded in the 1870s and 1880s around the railway workshop and was stimulated by the need for housing generated by the workshops. The names of many early settlers are continued in street names in the area, including Eveleigh, and many of the property boundaries and former watercourses are reflected in street patterns. At the time of the development of the railway workshops Darlington School was also built as were other municipal buildings (now demolished for the University). The suburb of Darlington was named after the English town on the first steam railway in the world and a photo of the first locomotive on the Stockton Darlington railway hung in Darlington School until it was resumed by the University.

The site continued to develop and in c.1917 additional land was resumed to the south-west and 230 houses were demolished to allow for the construction of the Alexandria Goods Yard. This land roughly approximates the land at the lower level of the ATP site bounded by Henderson Road to the south. Further land (and houses) were resumed for the eastern suburbs railway in 1960.

Figure 3.12: The initial buildings of the Railyards are shown at the top of this map. The lower part of the map shows the Shea's Creek (Alexandra) Canal. Detail of a Parish Map of Alexandria, c1915. Source: ISSN 1441-6352 Volume PMAPMN04, Parish Maps CD, County of Cumberland, Parish of Petersham, 14036802.

Figure 3.13: The initial buildings of the Railyards are shown in this detail of the c1915 Parish Map, map including the now demolished running sheds. The land resumed for the Alexandria Goods Yard is shown shaded (in red on the original) over the existing housing development. The land later resumed for the eastern suburbs railway is between the red area and Henderson Road, immediately to the south. Detail of a Parish Map of Alexandria, c1915. Source: ISSN 1441-6352 Volume PMAPMN04, Parish Maps CD, County of Cumberland, Parish of Petersham, 14036802.

3.4 DEVELOPMENT OF SYDNEY'S RAIL SYSTEM

The first railway in the world that operated with steam locomotives on iron rails was the Stockton and Darlington Railway in England, which opened in 1825. A boom in British railway construction followed the building of this railway and, in the five years to 1850 about 6,000 km of rails were laid in England by private railway operators.

Following trends in England, a committee was formed in Sydney to investigate the possibility of establishing a colonial rail network. A Sydney Railway Act was passed in October 1849 which authorised the Sydney Railway Company to build a Railway from Sydney towards Goulburn and towards Bathurst. Finally, on the 3rd of July 1850, the first turf for the Sydney Railway was turned in the Cleveland Paddock that lay near the end of today's Platform 3-4 at Sydney Central Station. The shovel and barrow used in the ceremony are now held by State Rail.

Despite disputes regarding gauge and rail type the Sydney Railway Company eventually purchased standard patent iron Barlow rails, locomotives and passenger wagons from England which arrived between October 1854 and January 1855. Railways in Melbourne and Newcastle also commenced construction in this period. The main Sydney terminus was proposed to be located in the Cleveland Paddock with a short branch line to be built to Darling Harbour to allow goods to be transferred to waiting ships.

Following a series of further loans from the Government and its continuing failure to raise enough funds for completion, the Sydney Railway Company's shareholders accepted the Government's offer to take over their investment on the 3rd of January 1855. By the time Sydney's first railway finally opened on September 26 it was a Government owned enterprise, the first Government owned railway in what was then the British Empire.

Initially a single line between Devonshire Street (then called Redfern but now called Sydney Terminal) and Parramatta was constructed, which although completed in August 1855, was not opened for another month awaiting the completion of temporary corrugated iron and timber passenger stations. The Sydney Terminal itself was a larger version of these hastily built structures and was only replaced by a more permanent building in 1872.

In December 1856 John Whitton arrived in Sydney to take up his appointment as the Engineer-in Chief. Whitton, who was to hold this position until 1890, was responsible for the expansion of the rail network into the interior of NSW.

Whitton was responsible for the major restructuring of the rail system which resulted in the resumption of land at Eveleigh and the relocation of the old Redfern workshops to this site and the subsequent expansion of lines and building of Sydney Terminal (Central). George Cowdery, Engineer for Existing Lines, executed the detailed design at Eveleigh.

When the Redfern to Parramatta line was opened, initially for passengers only, there were four trains a day, except Sundays, with first, second and third class carriages. The line was originally double-tracked as far as Newtown and single tracked beyond, but a second track was laid soon after. A line to Liverpool was completed a year later.

Once the benefits of railways had been appreciated, the people of NSW, and particularly their politicians, urged the building of more and more lines inland. During the mid 1870s, rail lines were being pushed by political urgency to country grazing areas. By 1873, lines from Sydney extended south to Goulburn and west to Raglan (near Bathurst) with a short north west branch to Richmond. Long extensions were built to Hay in 1882 and Bourke in 1885 to tap competing river traffic and bring produce to Sydney for export.

Figure 3.14: The Railway Station Redfern, 1893, Sir Arthur Streeton. At this time, Central Station was called Redfern and modern Redfern Station was called Eveleigh. Source: Smith 1995: 97.

Lines were extended to the borders of New South Wales to join with the railways of different gauges at Albury (for Melbourne) in 1881 and Wallangarra (for Brisbane) in 1888. The problem of the difference in rail gauge between NSW and the other colonies was recognised as early as 1855 but the possibility of linking Sydney directly with the other capitals by rail was considered remote because most interstate trade was still by sea and river.

Suburban traffic around Sydney was also increasing, requiring the construction of more stations and carriages to handle the increasing number of trains and passengers. By 1879, when planning for the new Eveleigh workshops commenced, the NSW Railway system had on its books 177 steam locomotives, 444 coaching vehicles and 3,867 goods wagons.

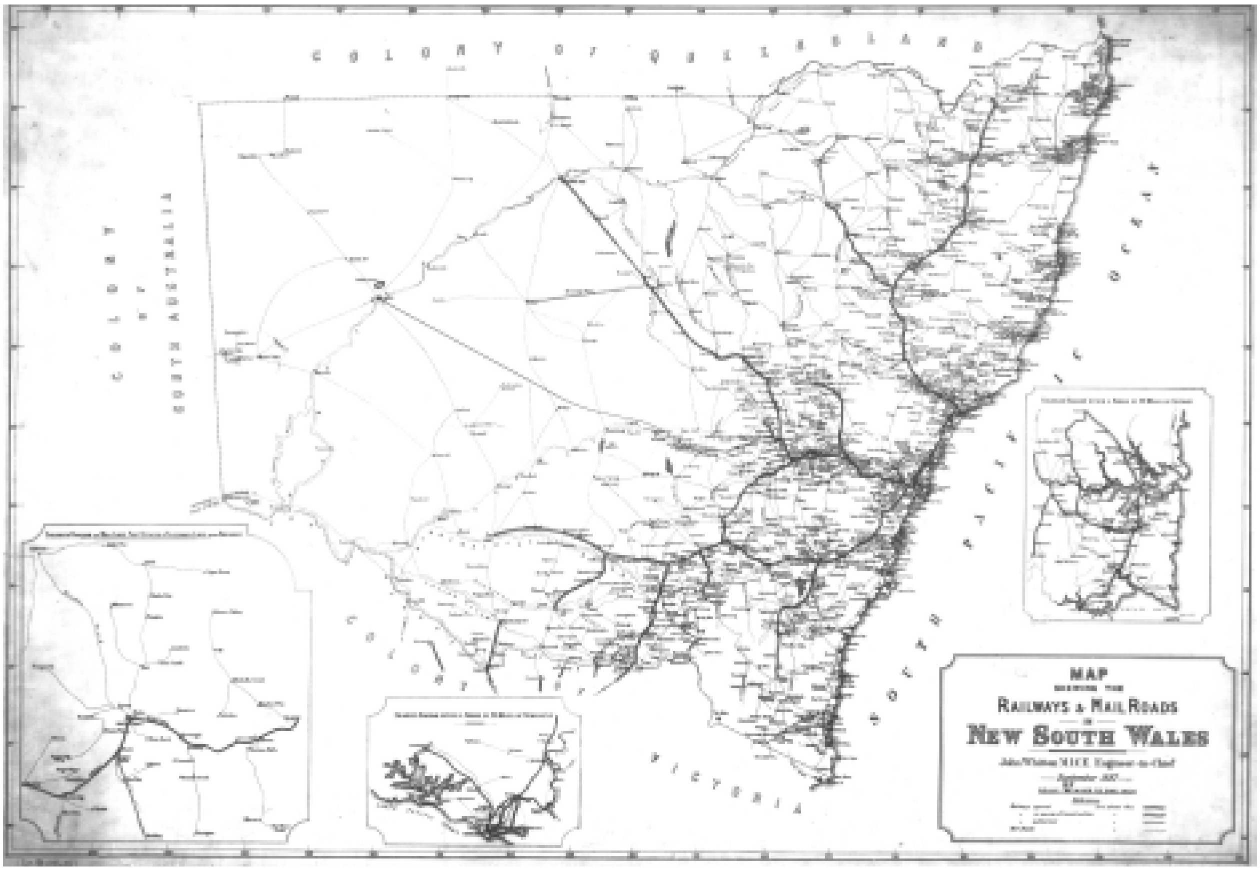


Figure 3.15: John Whitton's 1887 map of the Railways and Mail Roads of New South Wales. Source: ML ZM3 810gm/1887/1.

SYDNEY'S FIRST RAILWAY WORKSHOPS

The first Sydney railway workshop building was located at Redfern and was constructed c.1855. It was a substantial two-storey sandstone building with arched openings to both floors and a slate roof. The forge was located in an adjacent single storey building.

The Redfern Railway Yard (extending from just north of Cleveland Street to Devonshire Street) by 1864, included a workshop and forge, and an engine shed (c.1855), all connected by rail to a circular turntable. By 1865, a timber extension had been constructed over a section of track to allow locomotives to be worked on under cover. The complex also included a carriage shed, goods shed (located adjacent to the temporary shed) and a meat storage shed. The complex was often referred to as Redfern Station.

Figure 3.16: Redfern Terminal Engine Sheds, early 1870s. The design of these sheds is typical for the type and they are similar to English models. Source: Burk, 1988: 10.

To work the ever expanding rail system, an increasing number of goods and coaching vehicles was being built by firms such as Hudson Bros. at Redfern, and Russell & Co. at Darling Harbour. In addition, some vehicles were imported from England. The number of locomotives imported from England and the United States, was also rising.

As the system grew, the whole of the area southwest of the Devonshire Street terminal became a maze of railway lines, buildings, sidings, workshops and offices. Competing for space were the functions of repairing and repainting rolling stock, carrying out everyday locomotive maintenance, storing carriages and collecting and distributing goods.

A panorama of Redfern Railway Station drawn in 1870 (Fig: 3.17) shows how the complex had expanded since 1855. A more substantial brick passenger station was erected c1870. The carriage shed and the engine shed (both pre 1865) and the elaborately detailed single storey goods shed (by 1870) have a characteristic gable form. None of the workshop buildings are more than two bays wide. The form of workshop buildings is similar to that employed in England, although stone was more widely used as a building material in Sydney.

By the 1870s polychromatic brick work was favoured over the use of sandstone. The railways were one of the main users of brick, not only for their buildings but also for their retaining walls, viaducts and bridges.

In 1857, a separate railway line was opened linking Maitland and Newcastle with Sydney. This line was extended allowing for the export of coal. Workshops were erected at Honeysuckle, Newcastle, to serve this line. The Honeysuckle workshops used a similar gable ended form to the Redfern yard. Both sites enclosed two lines. A separate workshop was required at Newcastle prior to the construction of the Great Northern Railway in 1889 as there was no rail link between the Sydney network and the Newcastle line.

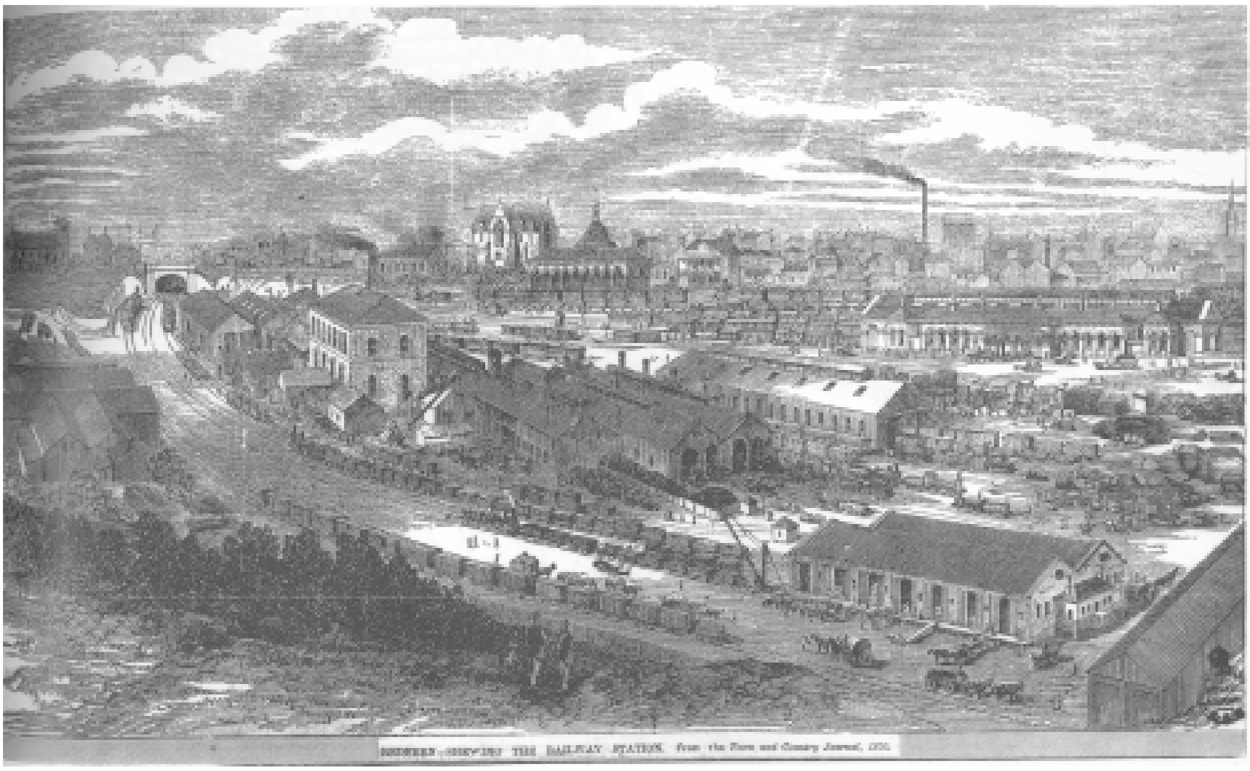


Figure 3.17: Panorama of the Redfern Railway Station, 1870. The print at the bottom of the etching reads " Redfern shewing the railway station, from the *Town and Country Journal 1870".* Source: Ashton *et al* 2000: 37.

In this section the original Bay numbers are used, 1-4, 4a and 5-15

3.5 EVELEIGH

NSW railway engineers of the 1870s and 1880s had all been trained on various British railway systems. They were therefore well aware of the British practice of private railway companies building and maintaining their own equipment in their own workshops. Some of the workshops with which they would have been familiar are Swindon (former Great Western Railway), Crewe (former London and North Western Railway), Doncaster (former Great Northern Railway), York and Darlington (former North Eastern Railway).

From 1874 to 1876, William Scott, New South Wales' Locomotive Foreman, was complaining about the inadequacy of the small and congested existing workshops for maintaining the growing numbers of vehicles in the New South Wales Government Railway's fleet.

The Chief Engineer of the NSW Railways, Mr John Whitton, concurred with Scott's numerous requests for improved workshop accommodation. Clearly he agreed that new facilities were a most pressing requirement, writing on 21st April 1876 '*I again call the Commissioner's attention to my minute ...with reference to the increased accommodation ... urgently required at the Sydney Station. Urgent and important*'.

On 25th November 1875, Whitton wrote to his Commissioner to propose the purchase of the Chisholm Estate, just beyond the Redfern tunnel, as the site for the new workshops.

Further similar representations from Whitton to the Commissioner followed in August 1876 but the Minister for Public Works, John Lackey, supported a plan placed before Cabinet to purchase land at Duck River (near Auburn) adjoining both sides of the Sydney-Parramatta railway line. This 83 acres (34 hectares) of land was bought on 27th November 1876. The land was cheap but Whitton and Mason (the Engineer for Existing Lines) were agreed in condemning it as unsuitable.

Other proposals were investigated and the Commissioner, Charles Goodchap, considered moving the workshops to Penrith, Picton or Liverpool. Several country towns, Murrurundi, Blayney, Orange and Dubbo, proposed themselves as suitable sites and P.N. Russell and Company, who manufactured rolling stock at Darling Harbour, also offered their site.

In this section the original Bay numbers are used, 1-4, 4a and 5-15

Mr R. H. Burnett was appointed as Locomotive Engineer on 1st September 1878, and almost immediately wrote to his Commissioner of the need for improved workshops to take up a serious backlog of maintenance on engines and vehicles. In the Annual Report of 1879, Burnett "*pointed to the disadvantages he [laboured] under…from the want of adequate workshop accommodation*" and advised that "*additional workshop accommodation* [was being built] *at New castle, Penrith, Bathurst and Goulburn*". This proved to be a short-sighted move as by 1889 it was recommended that surplus woodworking machines at country locations be transferred to the then new Eveleigh Workshops.

Burnett also advised of a "*pressing matter* [which] *requires notice, viz - the need for proper sheds, impervious to dust, in which the painting of the engines and carriages can be properly done. No suitable accommodation exists at present, and to attempt to carry on, in the open air, any but the most pressing work, is merely a waste of time and material. In the event of a dust storm arising while the paint or varnish is wet the work is spoiled.*"

He agreed with Scott, Whitton and Mason that the Duck River land was unsuitable and also supported the purchase of the Chisholm Estate for the purpose.

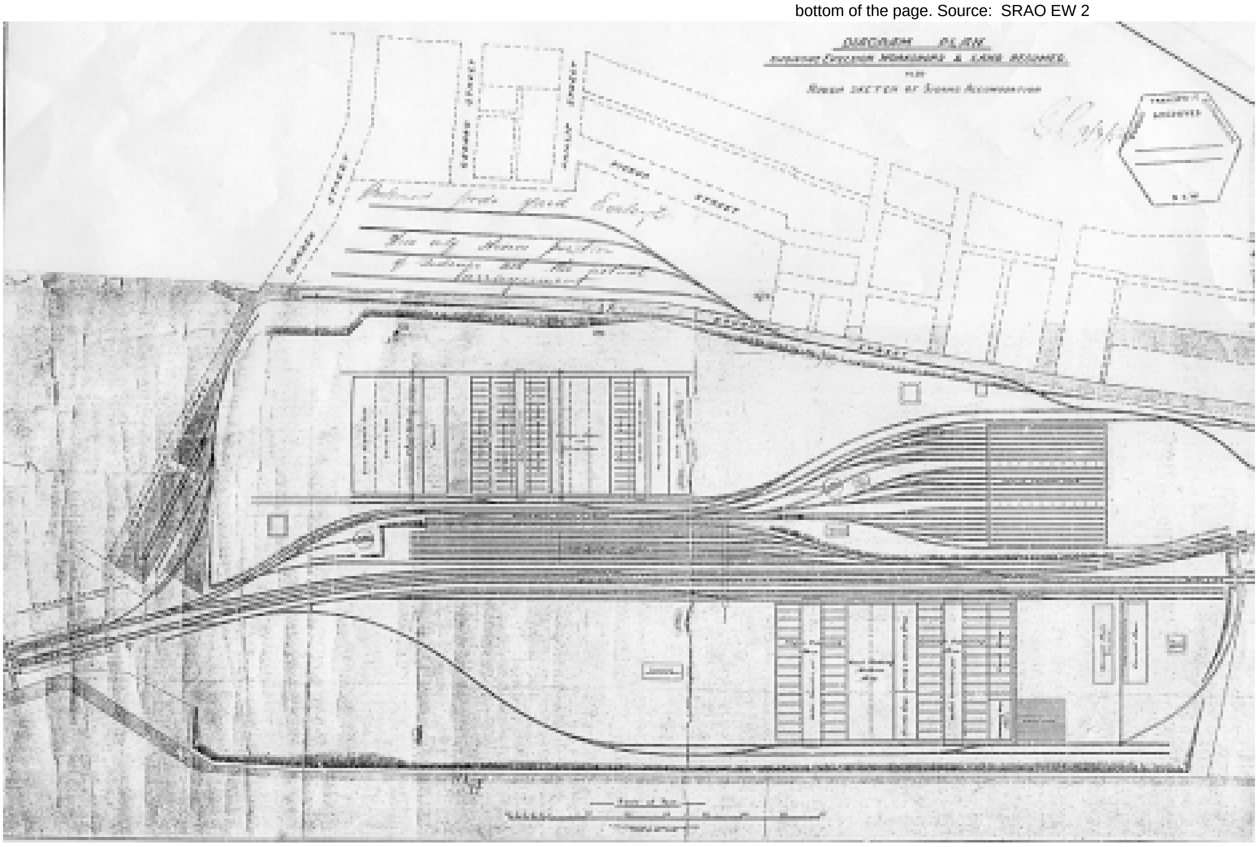


Figure 3.18: Plan of the Proposed Eveleigh Workshops, probably taken from the Railways Annual Report of 1881. In the centre left of the plan is the Locomotive Workshops shown as two separate buildings. The carriage Running Sheds are on the centre right of the plan. On the south (above) the worshops is a cutting with rail lines at the lower level. The dotted blocks and streets were later resumed for the Alexandra Goods yard. At the bottom of the plan is the main Carriage and Wagon Workshops building with, to the west, the two stores. The plan also shows a rail underpass at the far western end of the site. Note: on this plan north is to the bottom of the page. Source: SRAO EW 2

In this section the original Bay numbers are used, 1-4, 4a and 5-15

Finally, in July 1879, Parliament voted 100,000 pounds to purchase and level the Chisholm Estate, a 62 ¼ acre (23.2 hectare) undeveloped piece of land just to the west of the present Redfern station. This land stretched along both sides of the then Sydney to Parramatta rail line, extending from Wilson Street, Erskineville on the north to Henderson Road on the south and from the present Redfern to the present Macdonaldtown stations.

The Duck River land at Chullora was later put to use for goods marshalling yards and, from about 1909, a new workshops for goods wagons was built there and this work was removed from the Eveleigh Carriage and Wagon Workshops.

In 1880, Parliament voted 250,000 pounds to build and equip the workshops and the work approved was described as follows in the Railways Annual Report of 1881.

On the south side of the railway line (the ‘down line’ side) the following were to be built:

(a) A running shed (a depot to service, coal, water and prepare engines for every day operation);

(b) Workshops to repair all the engines, boilers, tenders utilising the related ‘black’ (i.e. ironworking) trades associated with working on iron and steel in machines;

(c) A shunting yard for placing goods wagons for loading and unloading south of the above two areas closer to Henderson Road, and on the north side of the railway line (the ‘up line’ side):

(d) ‘Carriage and waggon repairing shops in a block of buildings 600 x 350 feet, containing waggon repairing shops, wood working machine shop, fitting and turning shop, smiths’ shop, carriage repairing shop, paint shop, trimming shop, and stores. The whole of these shops will be amply fitted and provided with all the necessary machinery and appliances that may be required for the description of work to be performed. Communication of the shops with sidings and main lines will be effected by means of two steam travellers, by which the carriages and waggons can be deposited where required’.

(e) “The general Railway Stores, which are now being constructed, will consist of one main building 200 feet x 50 feet, And one open shed also 200 feet x 50 feet, also detached office buildings for the storekeeper and his staff. The stores will be fitted up in the most convenient manner, and will communicate with the main lines and workshops by means of sidings and turn-tables”,

(f) Space for expansion: “It will be noticed from the plan of general arrangement that ample space is still available on the western side for extension of, or additional workshops, when required”,

(g) Locomotive Engineer’s Offices, a two-storey building 100 feet x 50 feet, containing offices for the Locomotive Engineer, Locomotive Overseer, Locomotive Inspector and the professional and clerical staff, etc., in connection with the department. From the position of the building it commands a good view of the whole of the yard. In the plan accompanying the report, the building is shown as being located in the centre of the original portion of the Paint Shop, some distance from its eventual location on the Wilson Street boundary.

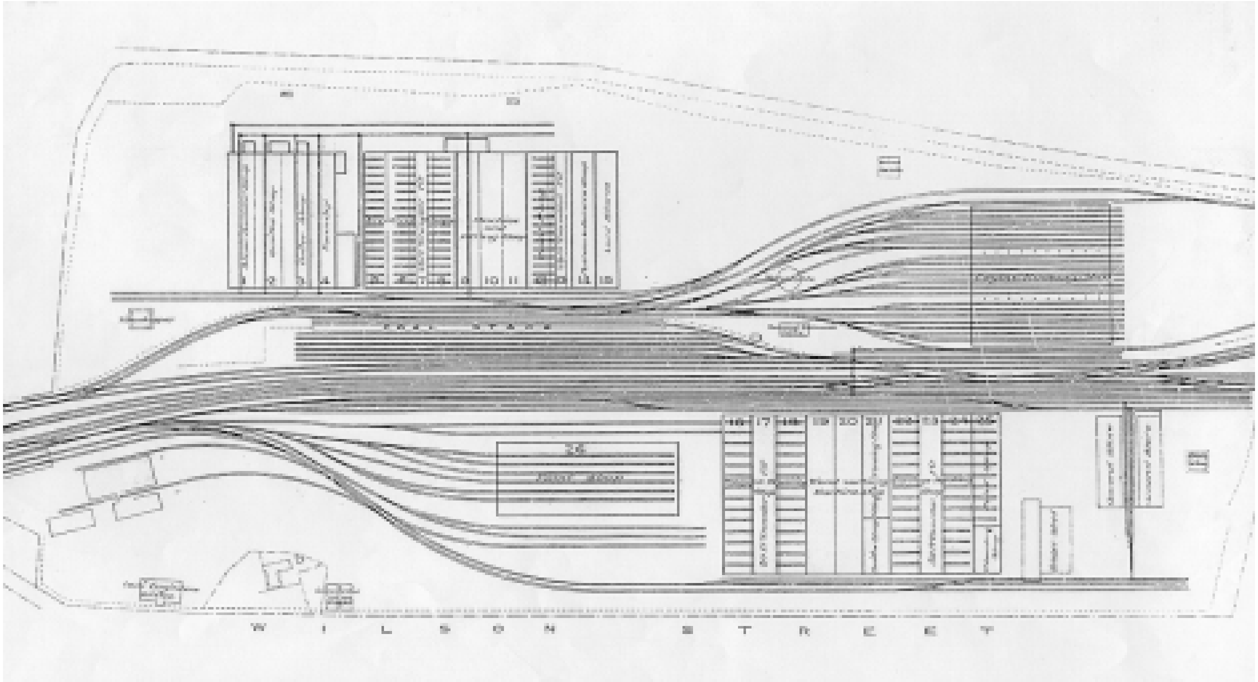


Figure 3.19: This 1889 plan shows the workshops as originally built including the numbers and functions of each bay, the locations of traversers, the engine running shed, the coal stacks and the underpass. Note: on this plan north is to the bottom of the page. Source: SRAO

The 1881 Annual Report also described the general arrangement of the features listed above:

"The workshops will be situated on both sides of the line between Eveleigh [now Redfern station] and Macdonald Town [sic]*, the area set apart for them being about 60 acres … The locomotive works, running sheds and shunting yard, etc., will be situated on the eastern side of the main lines, while the carriage and waggon shops, and the general railway stores will be situated on the western side."*

"The main point aimed at in planning the general scheme has been to arrange the different shops and branches in such a way that while the communication of the whole with the main lines will be free and unobstructed, the access to the several divisions will be effected without interfering with each other. Thus it will be seen from the plan that the several workshops, running sheds, shunting yards and general stores, etc., can separately communicate with the main lines, without in any way interfering with the traffic on those, or interfere with the traffic to or from each other."

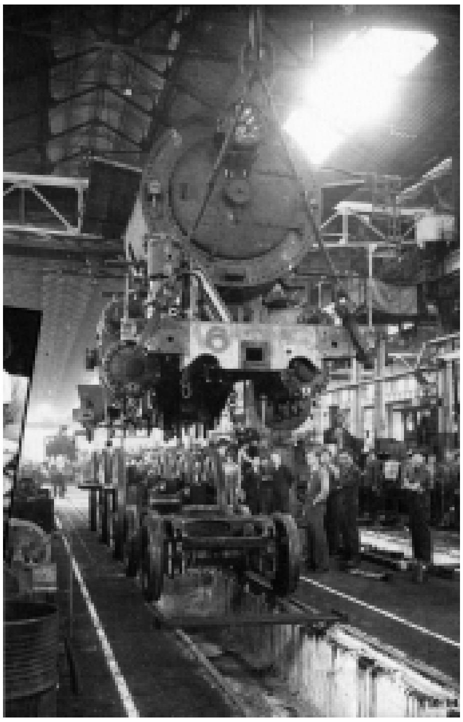


Figure 3.20: A C38 being lowered to the wheels in the Large Erecting Shop at Eveleigh, west of the Locomotive Workshops. This building remains in SRA ownership and use. Source: Burke 1988:191.

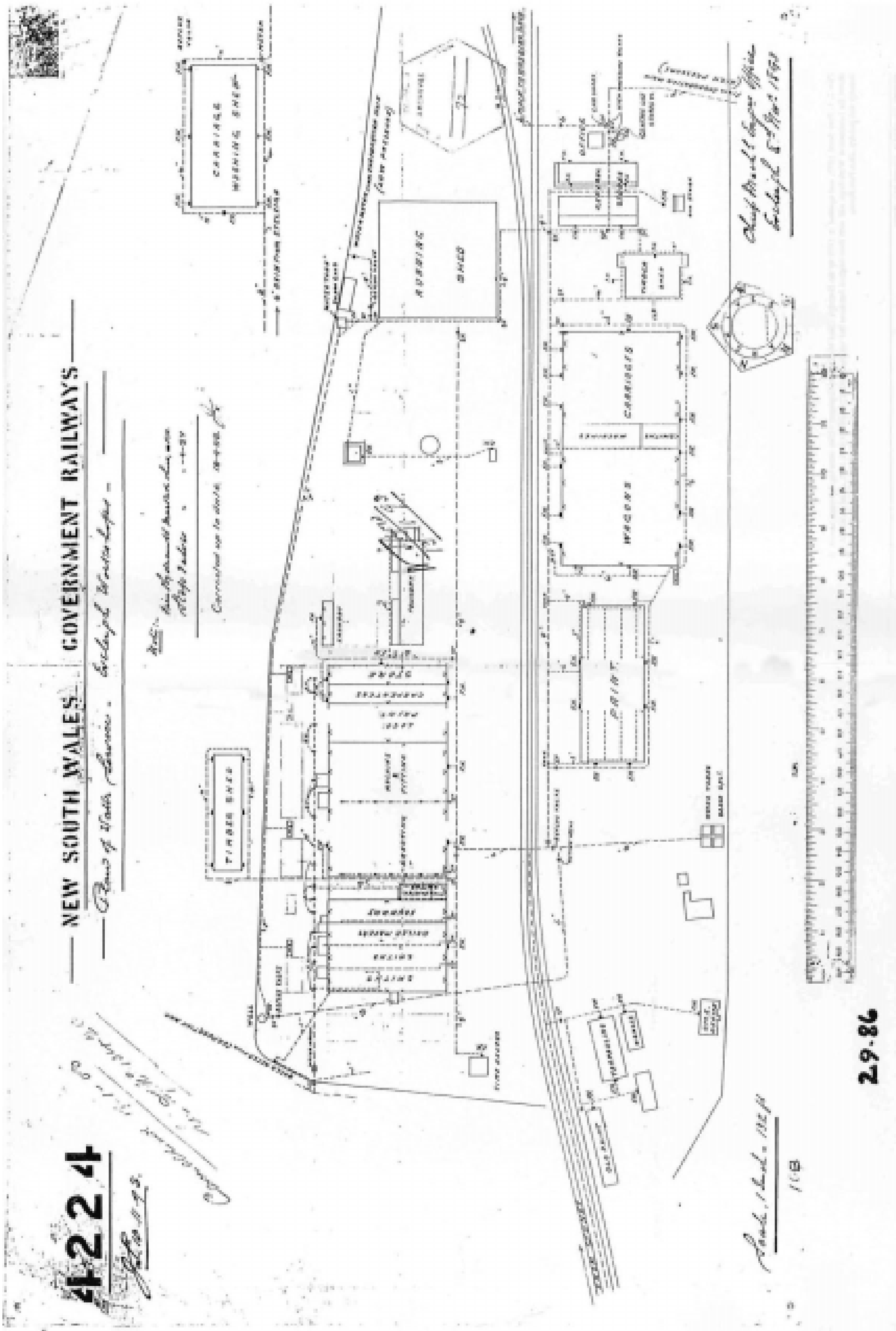
In this section the original Bay numbers are used, 1-4, 4a and 5-15

Figure 3.21: Eveleigh Engine Running Sheds, 1887. Exterior view showing Cowdery's segmental arched roofs each covering seven "roads". The last bay was demolished in 1960. Source: Burke, 1988: 142-143.

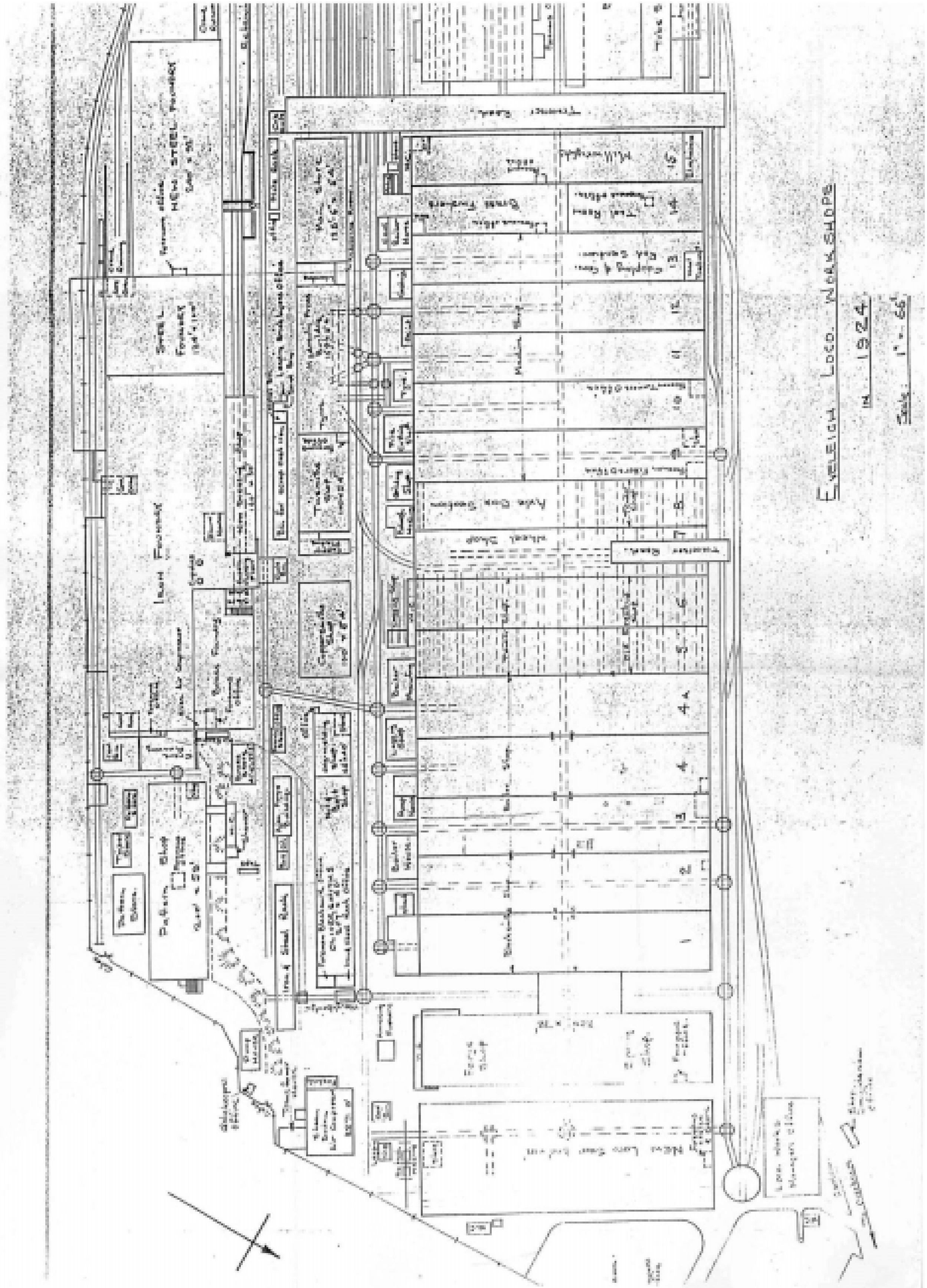
The original phase of the workshops to 1897 included Bays 1-15 of the Locomotive Workshops, Bays 16-25 of the Carriage Sheds, the Engine Running Shed, the Paint Shop, a General Store and various smaller buildings and the associated turntables, traversers and rail lines. The major changes since the original phase were the demolition of the Running Shed (northernmost bay in 1925, then the southernmost bay, and the middle bay in 1965) and the resumption of adjacent houses to the south for the Alexandria Goods Yard (c 1917).

Figure 3.22: Engine Running Shed, Eveleigh. The interior view shows the iron structure of the arched roof. Source: ML Frame no: GPO 1 - 31982

The site continued to grow and expand with functions and operations continually changing. In later years workshops at Chullora and Clyde took over aspects of work formerly performed at Eveleigh and functions were rearranged accordingly. The workshops declined gradually in the late twentieth century as the work culture changed, until their closure in 1988. Today the railway functions formerly carried out at Eveleigh are no longer carried out by government enterprises or no longer carried out in Australia.



Plan 3.1: Plan dated 1893 and updated in 1898 by the Chief Mechanical Engineer's Office showing the water services. It shows the Locomotive Workshops still with their original functions but various ancillary buildings have been added around it, e.g. foundry and laundry. Source: SRA Plan Room.



Plan 3.2: 1924 Plan showing the arrangement of the Locomotive Workshops. It indicates the function of each building and shows the rail lines, turntables and traversers linking buildings. Souce: SRA Plan Room.

RECENT HISTORY OF THE SITE

The site was used for Paddy's Markets from 1989 while construction work was underway on their Haymarket site. Various alterations were made to allow the market use including moving of machinery, construction of fire escapes and toilets and a concrete floor in Bay 14.

The City West Development Corporation (CWDC) was established in the early 1990s to manage the redevelopment of State Government owned land in the City West Region. The City West region comprised four precincts: Ultimo/ Pyrmont, Eveleigh, Central and The Bays.

In 1991 the NSW Government announced the creation of a Technology Park at Eveleigh in association with three universities.

Funding to the CWDC of $18m for the Eveleigh Master Plan area was provided by the Commonwealth and State under the Better Cities (BC) four year program finishing in June 1996. The BC program was concerned with urban redevelopment and its objectives were for more efficient, environmentally sustainable and socially just urban growth and change. The BC funding was not allocated for building works to the heritage buildings but did cover some infrastructure works associated with the buildings.

The CWDC was responsible for the preparation of the Australian Technology Park (ATP) Master Plan prepared in 1994. The CWDC progressively leased areas of the ATP site on the basis of 99-year leases.

Funding of $5 million, administered by the CWDC, was allocated to the Locomotive Workshop for expenditure over a five-year period. The funding covered building and site management, services and maintenance as well as some building works.

Australian Technology Park Sydney Limited (ATPSL), a company registered in 1993, was a joint venture between the University of Sydney, the University of NSW and the University of Technology, Sydney. A Board chaired by Mr J.C. Conde, AO, controlled ATPSL. The Board included the vice-chancellors of the universities and three representatives of private industry. Mr Tom Forgan was the Project Director. The role of the ATPSL was to establish and manage the technology park and its mission statement was:

Figure 3.23: Water tower to the south of the main workshops, 1993, when the site was used by Paddy's Markets.The former New Engine Shop is directly behind the tower in this photo. Source: ATP

Figure 3.24: Removal of rail on the southern side of the building. Source: OC+P

Figure 3.25: Turntables removed from the south side of the building. Source: OC+P

Figure 3.26: Machinery moved and stored in Bay 3 while the building was in use by Paddy's Markets. Source: David Sheedy.

In this section the original Bay numbers are used, 1-4, 4a and 5-15

…to establish a world class technology centre aimed at building global competitiveness in key growth sectors of the economy by forging links in the value chain between the intellectual and research resources available in the combined universities and clusters of firms in strategic industries through collaborative applied research and product development.

Figure 3.27: Stairs to the mezzanine in Bay 4 north. Note the two machines located adjacent to the stair. Source: OC+P

A development application was prepared for the Australian Technology Park in 1995, at the same time as the preparation of the 1995 Conservation Management Plan. The Conservation Management Plan recommended that Bays 1-4 to be kept open to demonstrate the scale of the structure and house the remaining machinery. The Development Application prepared by Crawford Partners left only Bays 1 & 2 to house the machinery and inserted office tenancies into Bays 3 & 4.

Figure 3.28: Modern industrial detailing to the new annex added in 1996. Source: OC+P

The DA was approved with conditions in June. The Eveleigh Locomotive Workshops Steering Committee (ELWSC) was set up at the time to oversee the development of the site and the adaptation of the Locomotive Workshops for the ATP. It included representatives of the Heritage Council and Department of Urban Affairs and Planning (DUAP) as approval authorities, the Government Architect as a representative of the NSW Department of Public Works who were documenting the project and Mr. Tom Forgen representing the project proponent, the ATP.

Figure 3.29: The traverser opening in these day has been utilised as a vehicle entry. The detail of the doors is derived from the original design. Source: OC+P

The ELSWC dealt with modifications to the development application during the course of the project and the implementation of the conditions of the DA approval. The name of the committee was changed to the Locomotive Workshop Working Group in December 1996 and terms of reference written.

Bays 1– 2 were retained with the blacksmith's machinery. Bays 3 – 4 were developed and the Conservatorium of Music became the tenant while construction work was underway on their building in Macquarie Street. Bays 10 – 14 were left open as an exhibition centre and to demonstrate the large internal spaces and exposed structure of the Locomotive Workshops.

Figure 3.30: The opening for the traverser has been utilised as a main entrance with a glazed entry. Source: OC+P

ATPSL took up the Locomotive Workshops progressively with a range of uses from 1996 onwards. By 2000 SHFA assumed management of the ATP from the Universities of Sydney, NSW and the University of Technology Sydney, as well as the Masterplan area from CWDC. By then, the bays were virtually all in use or let out, except for Bay 14, which remained vacant. The SHFA fitted out Bay 14 in 2001-02 for commercial tenants.

3.6 THE LOCOMOTIVE WORKSHOPS

3.6.1 Chronology

The chronology has been prepared from a range of primary and secondary sources, which are listed in the bibliography. The chronology covers both the site and the workshop but concentrates on the Locomotive Workshop.

1871 Planning for a large modern workshops complex at Redfern began.

1875 The site at Eveleigh was selected.

1880 Settlement for land was reached - 64.5 acres resumed from the estate of the late John Chisholm for c.£100,000.

1882 Clearing of land commenced. Because of the sandy nature of the soil, much work went into the design and construction of the workshop foundations.

1884 The contract for the construction of Bays 1-4 was let to George Fishburn for a cost of £40,725 and work was commenced shortly after.

1885 Work underway and purchase of machinery commenced. The foundations for Bays 5-15 were completed, enabling the contract for the construction of these bays to be let to John Ahern at a price of £80,837.

1886 Construction of the workshops continued.

1887 Workshops 1-4 were officially opened. These contained the ‘dirty trades’ of foundry work, boilermaking and blacksmithing. They were originally separated from Bays 5-15 by a space equivalent in width to one of the bays. Annexes were built on the southern and western sides.

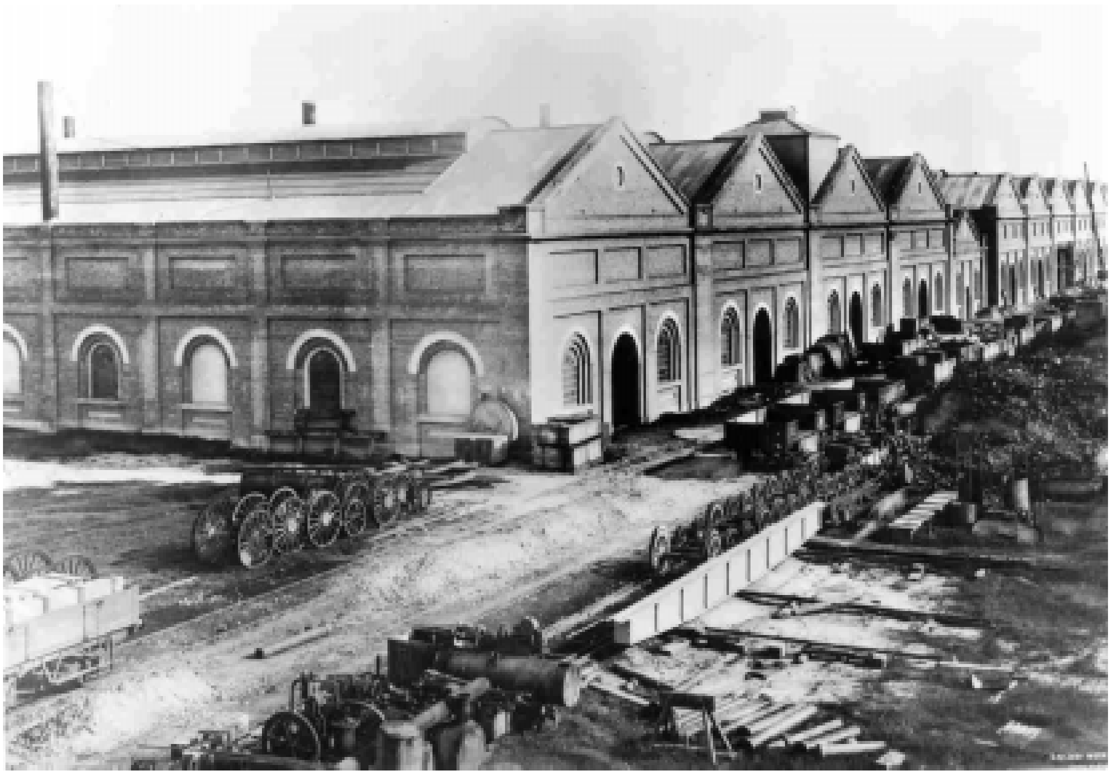


Figure 3.31: View from the north, Eveleigh Locomotive Workshops showing original configuration. Note eastern wall windows and Bay 4a. The brickwork that can be seen in Bay 4a is the end of the Copper and Tin Smiths’ Workshop. The original skylights can be seen on the roof of Bay 1. There is a turntable on tracks adjacent to Bay 1, 1884. Source: ML GPO Video Disk 1 06678

 In this section the original Bay numbers are used, 1-4, 4a and 5-15

1887 (late) Workshops 5-15 were completed and opened.

1889 Large Erecting Shop added to the site, to the west of the Loco Shop, enabling many of the engine repair functions to be removed from the main building. Work commenced on converting Bays 12 and 13 for an Interlocking Shop. This work began in November with the removal of the brick wall between Bays 11 and 12 and the installation of iron columns and crane girders. A compressed-air plant was installed in an annexe to Bays 3 and 4. New foundry erected adjacent to large Erecting shop allowing Boiler Shop to expand into Bay 4.

1892 Union negotiations led to the workshops being closed on Saturdays.

1896 Lightening rods fitted to 120-foot high chimney for Boiler House behind Bay 2/3. An extension of 200 feet added to the western end of the Large Erecting Shed (west of the Loco Shop) completed 1896.

1900 Compressed air plant installed in Boiler Shop (Bays 3-4) and air mains installed.

1901 By the end of 1901, work on the conversion of Bays 12 and 13 was near completion. The Ground-Traverser from Bay 13 was dismounted, removed and re-erected outside Bay 15 between it and the Large Erecting Shop. The rails in Bay 13 were removed, the pits filled-in and a crane installed in Bay 12. Work also began on the conversion of the rope-driven cranes to electric motor drives, as the recent installation of AC current generators at Ultimo Power Station had made the supply of electricity to the Railways easily and cheaply available. This work was completed for the main workshops in September 1902.

Figure 3.32: Interior view looking south along Bay 3, prior to the wall on the right being demolished. Note the wall engine at centre back. The flues correspond with the flues on the original plan. Source: ML GPO Video Disk 06681 Sh 976, 1884.

1902 A new Copper and Tinsmiths Shop was erected in a shed on the southern side of Bays 5-9, the former shop in the laneway between Bays 4 and 5 was demolished shortly after. A large corrugated iron building was erected on the eastern end of the workshops to house a Spring Shop in the northern half and Steam Hammer shop in the southern half. This allowed expansion of the Blacksmith Shop into Bay 1 and the Boiler Shop.

Most overhead cranes in the workshops were converted to electric drives. A 5-ton Craven electric crane was installed in Bay 9.

1903 The annexes located in the laneway between Bays 4 and 5 were demolished and the laneway was roofed over and end-walls erected to match the surrounding building. The wall adjoining Bay 4 was removed and replaced by iron columns. The Boiler Shop then expanded into this bay.

1905 The above works were largely completed.

1906 Ground Traverser between Bay 15 & Large Erecting Shed converted to electric power.

1907 The Commissioners for Railways decided to begin the manufacture of new locomotives at Eveleigh and the New Locomotive Shop (to the east of the Loco Shop) was designed and constructed for this purpose. A new compressor house was also established to the south of the New Locomotive Shop. Ground Traverser (between Bay 15 and the Large Erecting Shed) extended to south.

1908 Four “M” class Locomotive boilers installed in Bay 2-3 Boiler House (Annex).

1910 Construction of indoor toilet facilities in workshops - result of labour negotiations.

1911 A Grinding and File Making Shop was established in the old Cleaning Annexe behind Bay 9.

Figure 3.33: Eveleigh Rail Yard in 1910. The Spring Shop on the left. Note a second tower has been added and Bay 4a has been roofed over and a new end wall constructed. The new brickwork is lighter coloured in this photo. Source: ML GPO Video Disc 1, 12018.

In this section the original Bay numbers are used, 1-4, 4a and 5-15

1914 Electrification of machinery in the workshops was a major undertaking, Bay 14 was completed in January and Bays 8 and 9 were completed by the beginning of August.

Bay 11 became part of the Machine Shop as a temporary arrangement. It was also converted to electric drive.

Lockable tool room installed in Bay 14, a 110ft. long pit in constructed in Bay 4.

All steam pipes in the workshops were lagged with asbestos.

New Locomotive Shop extended to the South.

1914-18 *World War I*. War needs strained capacity of railways. Though workers supported the war, it brought worse conditions and declining wages.

1915 Bay 7 Ground Traverser was converted to electric drive.

The Machine Shop wall mounted steam engines were replaced by electric motors. An additional 25-ton electric overhead travelling crane was installed in Bay 4.

The Millwrights moved from the former Laundry into a section of Bay 9.

Public Works Annual Report includes "Report on Locomotive Manufactories and Locomotive Repairing Establishments", by A. Forster, Design Engineer, Metropolitan Railway Construction Branch. Report analyses workshops in Europe, England, America and Australia as a result of surveys in 1911-1914. The report concludes that Eveleigh works are too congested and recommends establishment of a new locomotive and repairing works.

Figure 3.34: Photo taken in 1915 of workshop employees showing their support for the ANZACS. It was sent in by Ms. Elaine Ward in response to a "Back to Eveleigh" Day and is evidence of the significance that the place has for not only workers, but their families also. It reads: ...*Enclosed is a photograph taken at Everleigh* [sic] *in 1915. My grandfather & uncle are in the photo. Their names were William Samuel Farrell & Lesley William Charles Farrell. I hope that you can find some use for the photo. I still have the original. Thanking you, Elaine Ward.* Source: Elaine Ward.

1916 Electrification of machinery in the machine shop (Bays 10-13) was completed.

Ajax forging machines were installed in the Blacksmiths Shop.

A trial production run of 5000 18lb field gun shells was made - this was later discontinued.

1917 A new Pattern Shop was constructed, the old Pattern Shop in Bay 14 was vacated and subsequently became part of the Machine Shop.

Several new buildings were completed which led to a rearrangement of the workshops. The Steam Hammer Shop was moved to a new shed to the south of Bay 1; Bays 1 and 2 remained the Blacksmiths Shop and Bays 3, 4 and 4a remained the Boiler Shop. Bays 5-8 contained the Old Erecting Shop, with the Traverser in Bay 7. Twenty-four engines and twelve tenders could be accommodated in this section. Bays 9-14 housed the now extensive Machine Shop, with the Tool Room on the northern side of Bay 14. The Millwrights were again moved, this time from Bay 9 to the northern side of Bay 15, which continued to house a Locomotive Store, much reduced in size, in its southern side.

Strained conditions led to eight strikes at Eveleigh between July 1915 and July 1917. In 1916 James Fraser (Acting Chief Commissioner) addressed workers at Eveleigh on introduction of the Taylor card system. The introduction of this system on 2 August 1917 led to an 82 day general strike. It started when 1100 men struck at Randwick Tramway Depot and 3000 at Eveleigh. Volunteers kept trains running including boys from Newington and S.C.E.G.S. (Shore) private schools at Eveleigh.

1922 The Bay 7 Ground Traverser was removed and the Bay converted into another workshop with a 35-ton electric overhead crane installed.

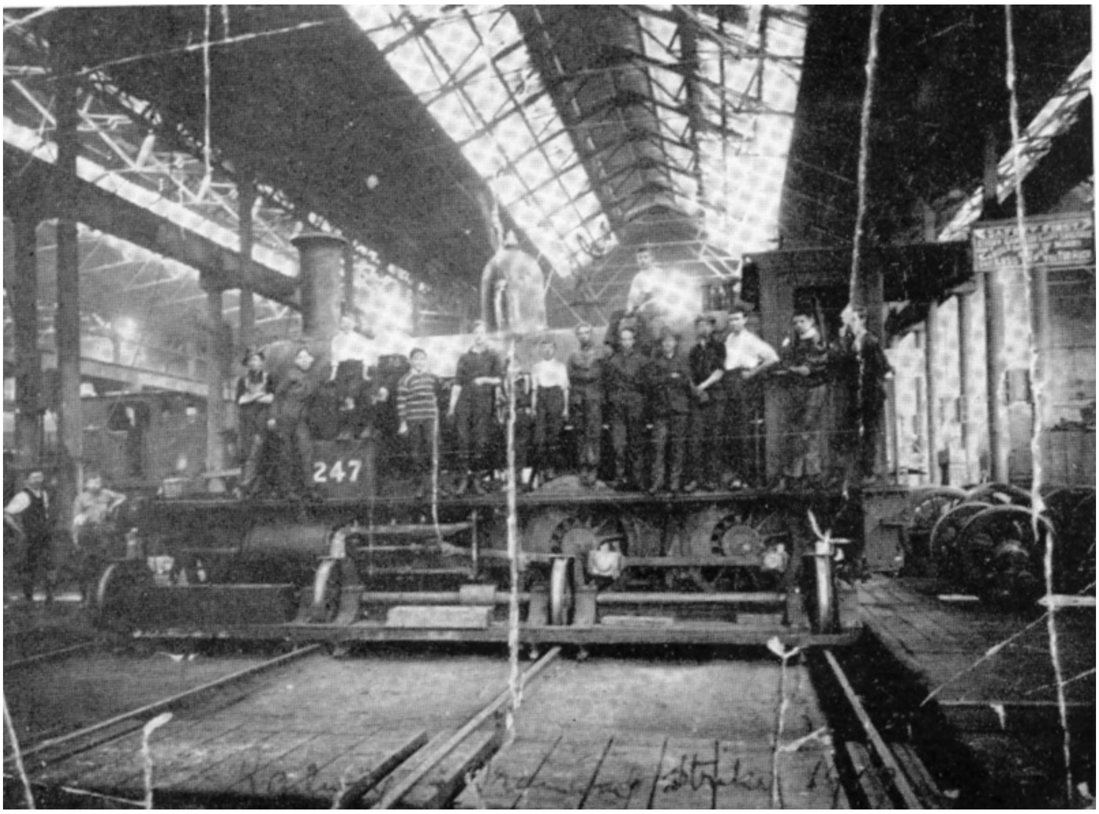


Figure 3.35: Schoolboys from Newington in the Eveleigh Workshops during railway strike, 1917. Note that the boys are standing on a locomotive which is on the traverser. This must have been in Bay 7 as the Bay 13 traverser had already been moved out of the building. Source: Macmillan 1963: 89.

In this section the original Bay numbers are used, 1-4, 4a and 5-15

1923 A major portion of the boiler repair work was shifted to a new facility at Chullora.

1924 First Australian Railways Union (ARU) Shop Committee established at Eveleigh.

1925 The northern half of Bay 1 was cleared and a 1500-ton capacity 'Davy' press was imported from England and installed. Two boilers were installed with it to provide steam to drive the air-compressor which drove the press. The boilers penetrated the east wall with the flues outside and the furnaces inside. New crane installed at about this time to service the Davy press.

Manufacture of new locomotives ceased at Eveleigh.

1937 More facilities open at the Chullora Workshop opened enabling much of the repair work to be removed from Eveleigh and the old Erecting Shop located in Bays 5 and 6 was vacated later in the year.

1939 Shower facilities installed in response to union action.

1939-45 World War II

1940s Stan Jones led Eveleigh Shop Committee of ARU. Jones was an influential figure and one of the Communist Party's leading activists.

1940 As a result of World War II, Bays 5 and 6 were cleared of machinery and plans drawn up for the installation of equipment supplied by the Department of Defence for the manufacture of 25lb field-gun shells.

1941 A mezzanine floor supported on timber columns was added to Bay 5 and the machinery for shell manufacture installed by February. Bay 8 was altered for a munitions annexe.

1943 By this year Bay 8 was vacated as the Department of Defence had organised its own factories. The Millwrights was gradually transferred from Bay 15 to this location.

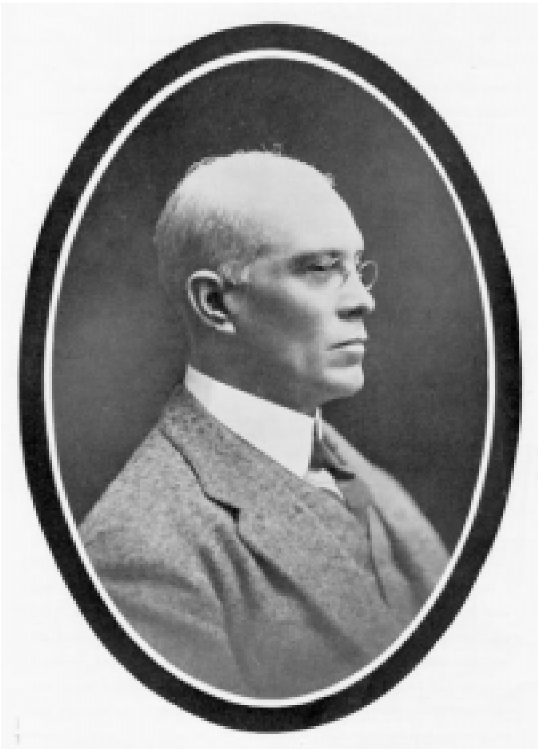


Figure 3.36: James Fraser the Acting Chief Commissioner introduced the "Taylor Card System" in 1917. The result was a statewide general strike that lasted over two months supported by almost ninety-eight thousand workers who walked off the job. Nevertheless, when work resumed, conditions did not improve and strikers were stripped of seniority and privileges. Source: Dept. Railways New South Wales 1955: 217.

1945	Production of 25lb field-gun shells ceased in Bay 5 with the end of World War II. The machinery was removed soon after.
	Reintroduction of construction of new locomotives.
1946	The transfer of Fitting Shop machinery from Bay 15 where it was housed during the war, to Bays 6 and 7 was completed by August.
	The crane runway of the 5-ton crane in Bay 1 was extended in October. (This crane runway was probably the one originally installed in 1925 with the Davy Press).
1947	Forty-eight 25-cycle AC welding power points were installed around the workshops.
1948	Hail storm damage to glass roof, New Year's Day. The last time glass was used in the roof.
1949	Plans were drawn up to convert the Bay 5 mezzanine level to a staff canteen and meal room with a recreation facility. This was carried out later in that year.
	Stan Jones resigns over coal strike.
1940s(late)	Cleaning of boilers, as described by Vince Kenny, involved stripping interior of boilers causing the whole shop to be full of asbestos dust.
1952	Construction of new locomotives ceased.
1955	The Machine Shop, which now occupied seven bays, provided 7,000 separate items per year in addition to the milling and machining of parts for the repair of locomotives.
	Railway centenary
1950s	Contracting of work to private workshops increased due to lack of staff.
c.1965	Steam locomotion abandoned.

Figure 3.37: View from Redfern overbridge. Bay 3 has a high level window. Note the chimney stack behind the workshops at the left of the photo, the additional tower, which now total three, Bay 4a has been enclosed, Bay 7 still has the traverser opening and the Spring Shop is to the north of the Workshops. SRAO ELW 601/41

In this section the original Bay numbers are used, 1-4, 4a and 5-15

1970s Rearrangement and re-equipment to update the works. The Blacksmiths remained in Bays 1 and 2. Bay 3 contained a Hot Spring Coiling Section in its northern half and a Heat Treatment Plan in its southern half and Bays 4 and 4a contained a Fabrication Shop. Bay 5 contained the Staff Canteen in its southern half and a portion of the Fitting Shop in its northern half. Bay 6 housed the Fitting Shop in its southern half and the Apprentice Section in its northern half, while Bays 7 and 8 contained the majority of the Fitting Shop. Bay 9 was given over to the production of wheels and axles and Bays 10,11 and 12 contained the Machine Shop. Bays 13 and 14 housed an Air Brakes Shop in their southern half and the Tool Room occupied the northern half of both bays. Bay 15 housed a Rail Motor Test Room on the north side and a store remained in the southern half.

1980s Decisions taken to remove railway workshop activities from the Eveleigh Locomotive Workshops. Activities progressively wound down.

1988 Railway workshops activities closed.

1989 Paddy's Markets relocated to Bays 5-15; Remaining historic machinery relocated to Bays 1-4a. From 1989, other buildings on site were progressively demolished over an extended period including the Pattern Shed, Foundry, Smith's Shops and most recently the Wheelpress Shop.

Figure 3.38: Fitters at Eveleigh sheperd 5801 from the Locomotive Workshops for the trial trip of 19th January 1950. The mountain type of D58 was the largest locomotive built in Department workshops. Eleven were built at Eveleigh and another two at Cardiff. The building in the photo is the large Erecting Shed to the west of the Locomotive Workshops. Source: Burke D, 1988: 193-194.

1991 NSW Government announced the creation of a Technology Park at Eveleigh in association with the University of NSW, the University of Sydney and the University of Technology, Sydney.

Decontamination works were carried out to cleared areas of the site progressively. Arsenic was one of the main contaminants as it was used in the case-hardening process.

1994 Paddy's Market returns to Haymarket.

1995 City West Development Corporation takes ownership of the Locomotive Workshops, Bays 1-15, in addition to the New Locomotive Shed and the Manager's Office.

Contracts let for the conversion and adaptive re-use of the former New Locomotive Shed and Manager's Office and for construction of public domain works.

ATP established after the State Government invested funds to preserve the heritage of the Eveleigh Workshops, with the involvement of the University of New South Wales, the University of Sydney, and the University of Technology, Sydney.

2000 The Sydney Harbour Foreshore Authority assumed control of the Eveleigh Locomotive Workshops from the City West Development Corporation and managerial control from the Universities of Sydney and New South Wales and the University of Technology Sydney.

Figure 3.39: Views of the Locomotive Workshops when occupied by Paddy's Market. Souce: David Sheedy.

In this section the original Bay numbers are used, 1-4, 4a and 5-15

3.6.2 Sequence of Development

The sequence of development of the Eveleigh Workshops is shown in the following overlays of historic plans with the current aerial photo. These are followed by a diagram indicating changes to the Locomotive Workshops building over time. The main structure of the Eveleigh Locomotive Workshops was little altered in fabric or function from its original construction until its closure although there were many small additions and some functions moved from bay to bay or to other buildings. The diagram (Fig. 3.44) is based on analysis of plans held in railway archives and to historical photographs. Some of the plans have been reproduced at the end of 3.6.2. See captions and notes on photographs and plans for additional information. The SRA plan room was visited in 1995 and was found to hold some hundreds of plans relating to this building. These plans have now been transferred to State Records and are not yet readily accessible. The Rail Infrastructure Corporation (RIC) plan room has provided more plans of the site. Diagrams indicate the way the workshops developed generally and the configuration of the buildings at the end of each phase but do not address internal arrangements in detail.

Figure 3.40: Part of a Parish Map of Petersham, pre 1855 is overlaid with a 2000 aerial photo indicating the location of the swampy areas. The boundaries of the original land grants can be seen to line up with the later streets. Source: Overlay by OC+P PL. Historic map from ISSN 1441-6352 Volume PMAPMN04, Parish Maps CD, County of Cumberland, Parish of Petersham, 14062201, AO Map No. 341 is written on the image.

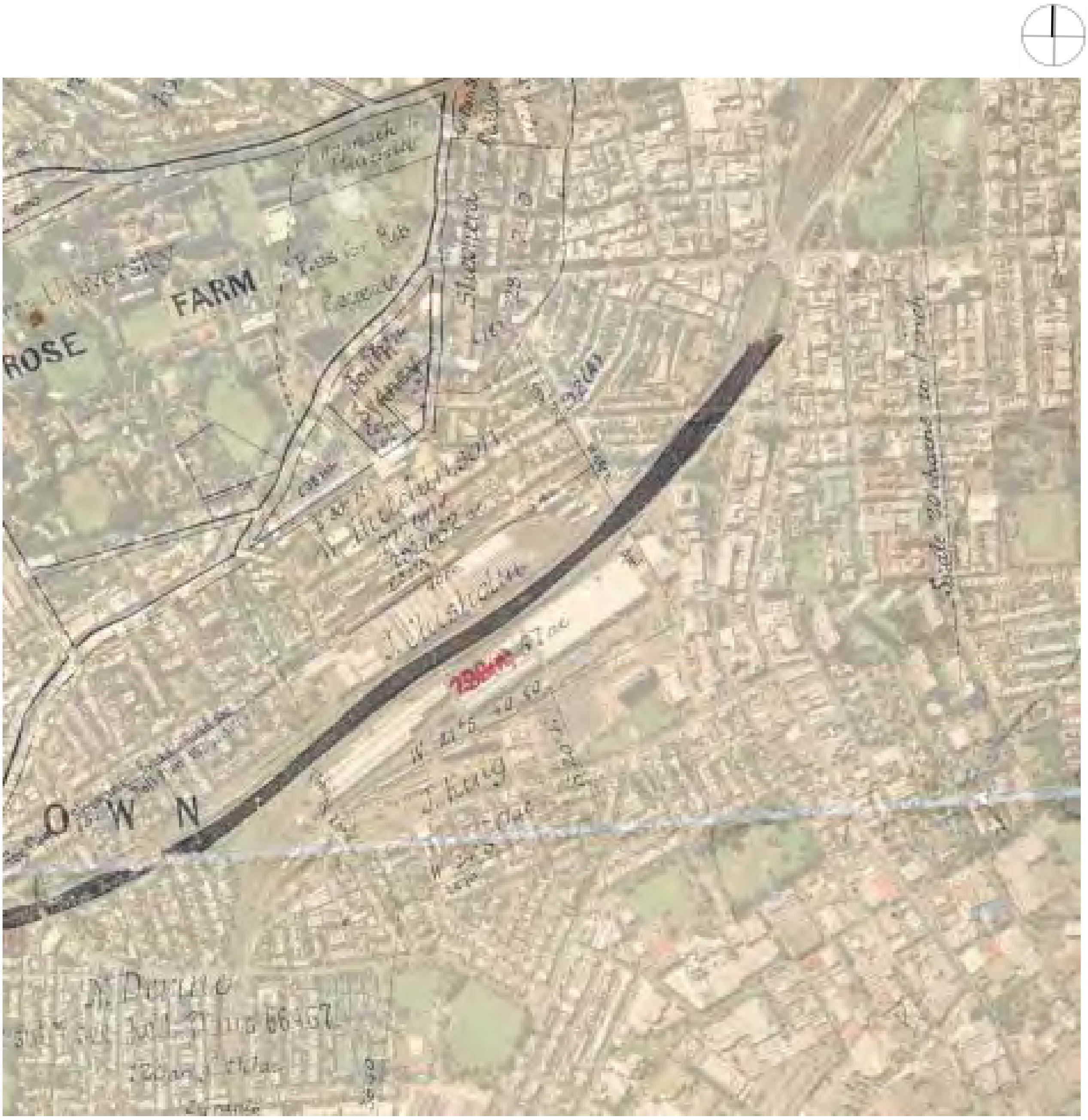


Figure 3.41: The 1855 rail line bisecting Chisholm's estate is shown on this detail of a Parish Map of Petersham, c1855-60 which is overlaid on the 2000 aerial photo. The property has not yet been purchased for the workshops but the grant boundaries can be seen in relation to the street pattern today. Source: overlay by OC+P PL. Historic map from ISSN 1441-6352 Volume PMAPMN04, Parish Maps CD, County of Cumberland, Parish of Petersham, 14072901, written on the map is AO Map 262

 In this section the original Bay numbers are used, 1-4, 4a and 5-15

Figure 3.42: The initial Railyards are shown with the now demolished running shed and the land resumed for the Alexandria Goods yard shown as shaded (marked in red on the original) . Detail of a Parish Map of Alexandria, c1915 overlaid with the 2000 aerial photo. Source: Overlay by OC+P PL. Historic map from ISSN 1441-6352 Volume PMAPMN04, Parish Maps CD, County of Cumberland, Parish of Petersham, 14036802.

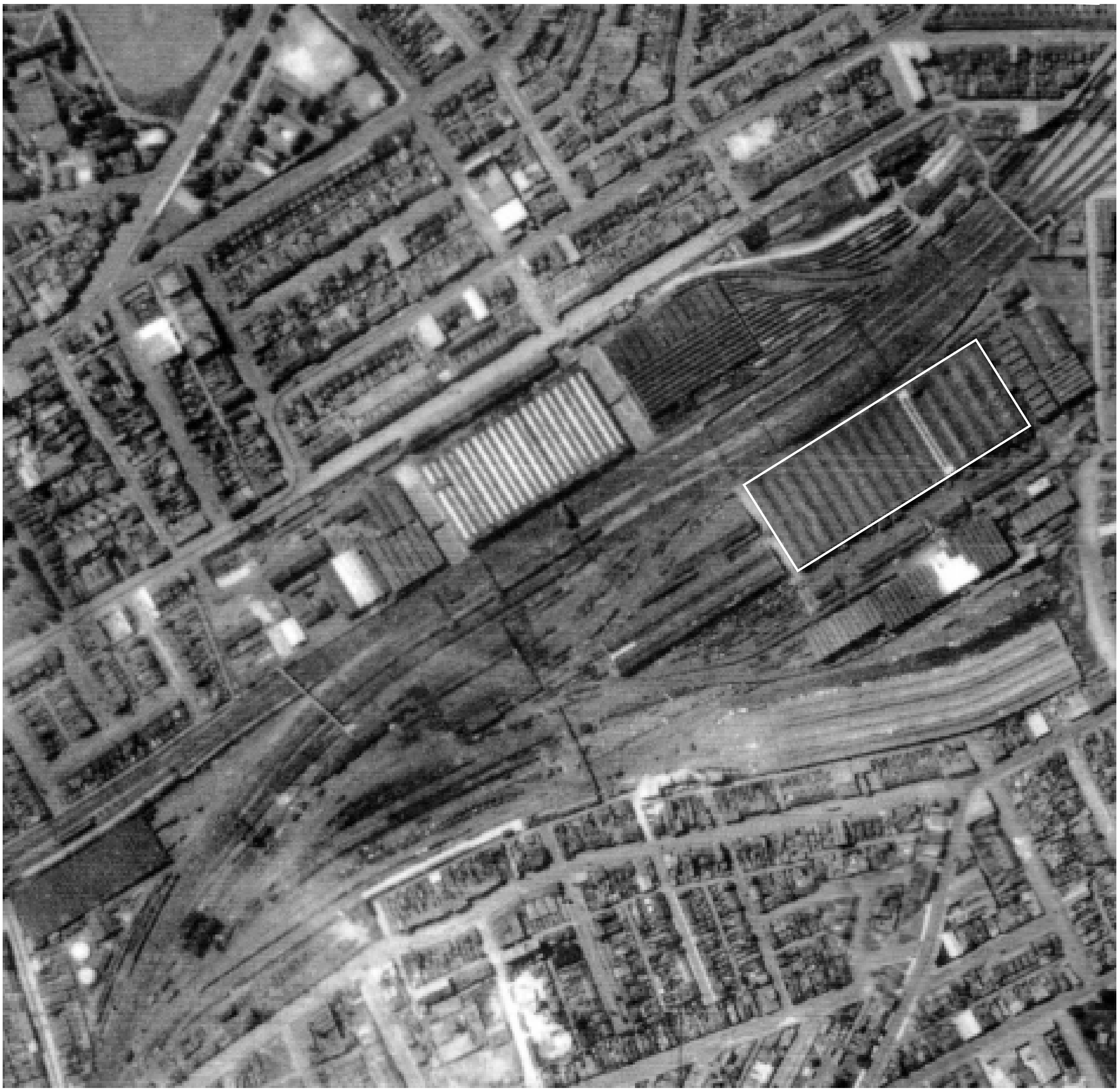
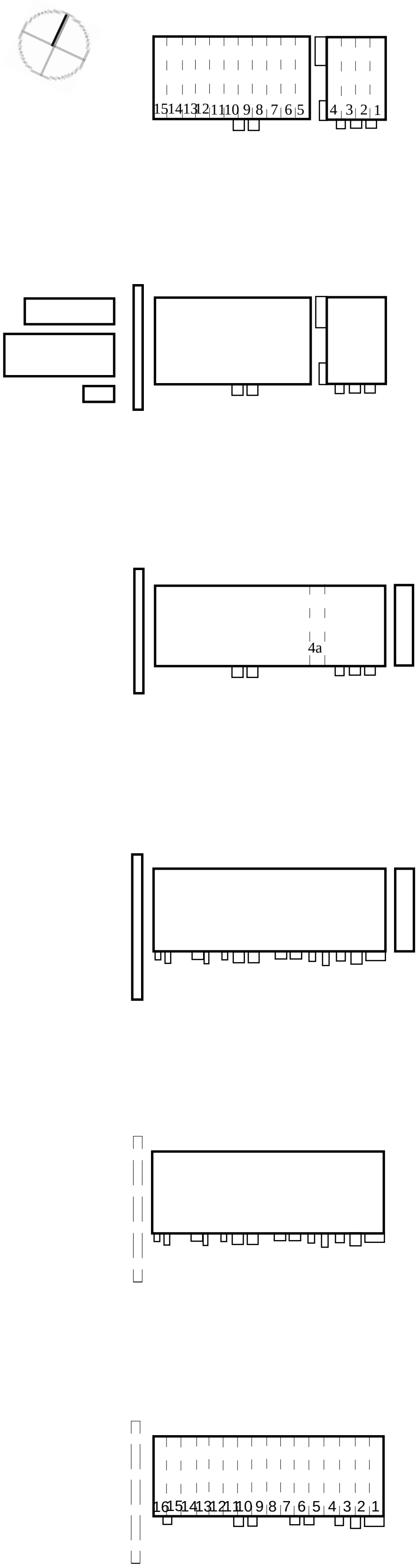


Figure 3.43: The full extent of the Eveleigh Workshops is shown in this 1930s aerial photo of the place. The Locomotive Workshops building is outlined. Source: Department of Lands, Map Room.



1887
Locomotive Workshops completed

Bays	1887
1	Steam Hammer Shop
2	Smith's Shop
3	Boiler Shop
4	Foundry
5	Tender Shop
6-8	Erecting Shop
9-11	Machine & Fitting Shop
12-13	Paint Shop
14	Pattern & Joinery Shop
15	Loco Store

1901
The Large Erecting Shop, new Foundry and the Laundry have been constructed west of the traverser. The traverser was relocated from Bay 13 to west of the Locomotive Workhops.

Bays	1897
1-2	Smith's Shop
3	Boiler Shop
4	Foundry
5-8	Erecting Shop
9-11	Machine & Fitting Shop
12-13	Paint Shop
14	Carpenter's Shop
15	Loco Store

1905
Bay 4a has been enclosed and the Spring Shop established on the east side of Bay 1. (The buildings to the west of the traverser not shown).

Bays	1905
1-2	Blacksmith's
3-4a	Boiler Shop
5-8	Erecting shop
9-11	Machine & Fitting Shop
12-13	Paint Shop
14	Carpenter's Shop
15	Loco Store

1924
The traverser was extended in 1907 to serve new workshops located south of the Locomotive workshops and some functions were transferred to these new buildings, eg. pattern making and Loco Store.

Bays	1924
1-2	Blacksmith's
3-4a	Boiler Shop
5-6	Tender Shop
7	Traverser & Wheel Shop
8	Tender Shop
9-13	Machine Shop
14	Tool Room/Brass Finishers
15	Millwrights

1984
In 1988 railway workshops activities closed. Workshops were rearranged internally in the 1970s to update the works. The Spring Shop was removed at about this time. The traverser rails were covered by asphalt.

Bays	1984
1-2	Blacksmith's
3	New Spring shop/Heat Treatment
4-4a	Fabrication Shop
5	Fitting/Canteen
6	Millwrights/Bar Store
7-8	Fitting Shop
9	Wheels & Axles
10-12	Machine Shop
13-14	Tool Room/Air Brakes
15	Rail Motor Test Room/Store

1996
The place was redeveloped as a Technology Park. Intrusive annexes were demolished, three new annexes were added and the bays were renumbered. Mezzanines were built internally. Sydney Harbour Foreshore Authority assumed control from the CityWest Development Corporation in 2000.

Bays	2002
1-2	Blacksmith's
3-5	Education/conference
6-7	Small IT companies
8	Admin/research/cafe
9	Small IT companies
10-14	Exhibition Hall
15	Office space
16	Small IT companies

Figure 3.44: Sequence of development.

Figure 3.45: This photo of metal forging and pressing, is taken in either the building previously located in the present Innovation Plaza or one of the forge buildings south of the Locomotive Workshop. Source: Sydney Harbour Foreshore Authority.-

Figure 3.46: Heating metal in a forge. Source: Sydney Harbour Forshore Authority.

3.6.3 Operation

Figure 3.47: Steam driven wall engine of the type used at Eveleigh to drive cranes) and possibly line shafts. Source: SRAO ELW 601/49.

When first conceived by John Whitton, the Eveleigh Railway Workshops were to undertake the construction of the infrastructure of the Railways such as the safe working systems and some of the perway systems. Their main tasks however, were the maintenance and repair of locomotives and rolling stock and the manufacture of rolling stock such as wagons and passenger carriages. At the time they were built, there was no other facility in NSW for the construction of locomotives.

The workshops were established on both the north and south sides of the main western and southern rail lines, which led to a duplication of some workshop functions, but the really heavy work, such as forging and casting of ferrous and non-ferrous metal, was to be carried out on the locomotive side. When the workshops were established, most of the rolling stock had a wooden chassis, so the separation of services was not a major impediment to production. The locomotive workshops were virtually set up as a medium engineering enterprise. They were designed as two separate buildings - one of four bays and one of eleven bays - each of which was to serve a different function.

The so-called ‘dirty trades’ of foundry, blacksmithing and boilermaking were located in Bays 1-4. In reality these were not so much the dirty trades but were those which required fire as an operating element. In the annexes which were built on the western end of Bay 4, where Bay 4a is now located, were housed the coppersmiths and the tinsmiths sections. These trades were distinctly “cleaner” than the blacksmiths and foundrymen but they also needed heat for soldering and annealing and tinning of their products. Most soldering, which was almost certainly brazing, was of heavy units and would have been completed on a forge using spelter.

Bay 1 and 2 were generally known as the blacksmiths or smiths shops, although on some early drawings Bay 1 has been termed the steam hammer shop, Bay 2 the smiths shop, Bay 3 the boilersmiths shop and Bay 4 the foundry.

The steam hammer shop appears to have been equipped with nine forges on the eastern side of Bay 1 and thirteen forges on the western side. An early photograph indicates there were an average of three forges to each steam hammer. The forges were of the typical railway type with cast iron hoods and tuyeres serving a cast iron fire bed covered in firebrick. The cast iron tuyeres (air inlets) were water-cooled. Air was supplied via blowers erected against the south wall of Bays 1 and 2. The air reached the machinery through underground pipes that still exist and are operational.

The precise type of hammers that were installed in the steam hammer shop, when the locomotive workshops were established, is unknown. However it is likely that they were similar to the ones extant in the Bay 2 north and it would appear, from early photographs, that the extant arch hammer and the 20cwt hammer were installed shortly after the workshops opened. In the blacksmiths shop, the 1912 drawing indicates that there were four steam hammers in the precise location in Bay 2 north in which the steam hammers are now located and the drawing also indicates the Rootes blowers and other items within the workshop.

The boiler shop was equipped with larger forges than found in the Blacksmiths shop. On the early drawing, these forges are called Boilersmith fires and there is a total of five fires, each with a hearth area at least four times of that of the normal smiths forges. It is apparent that the boiler shell material was heated here so the holes for the rivets could be punched.

All of the flues from the forges, which were vertical, passed into an almost horizontal overhead flue which was about a metre in diameter. This overhead flue then passed into two 10m high stacks which were also about 1m in diameter. These steel stacks appear not to have been equipped with an induced draft fan, the heat from the forges being sufficient to create a draft.

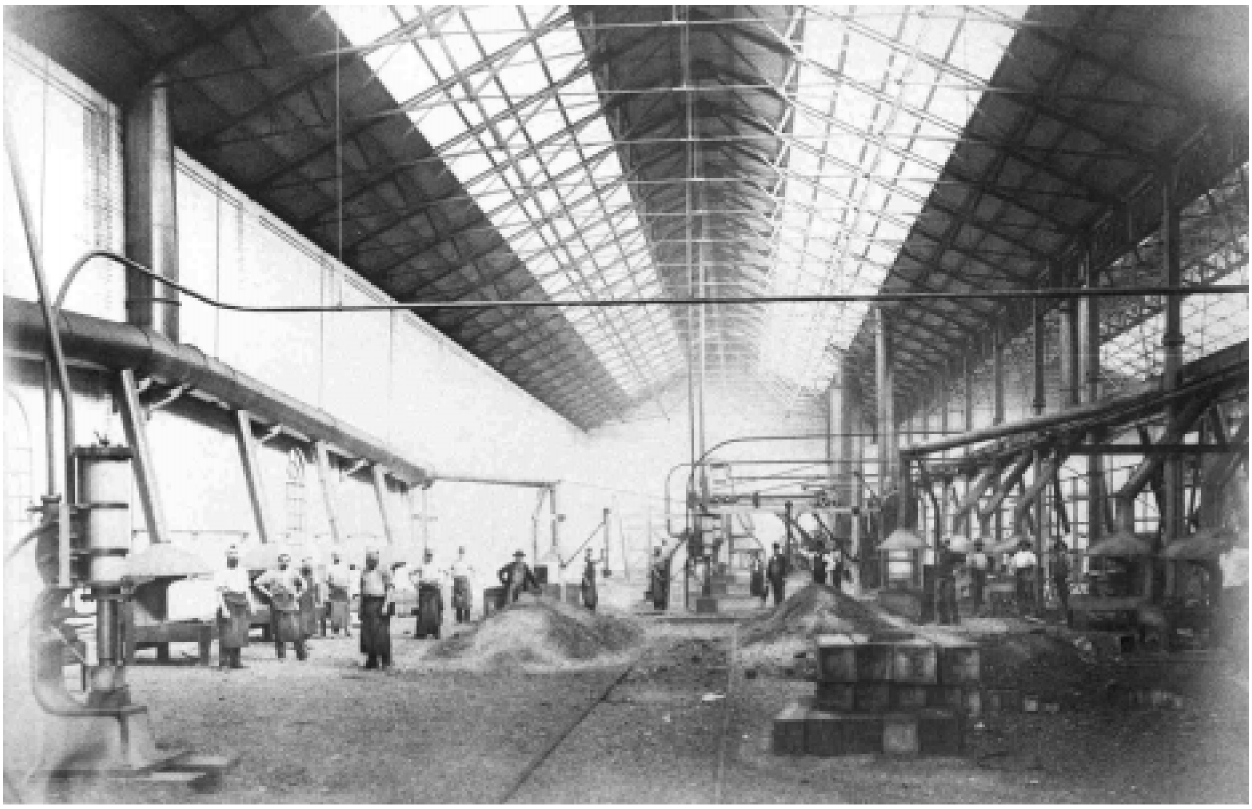


Figure 3.48: Steam Hammer Shop, believed to be Bay 1 north, looking south, taken soon after opening of the workshops. Small steam hammer l.h.s. foreground, 8cwt(?) steam hammer mid background obscuring a further two steam hammers with the arch hammer in background. Note the tool racks between Bays 1 & 2 (r.h.s.) which are still there. Rail track in foreground believed to be to remove ash (visible in two piles). Blocks of timber (r.h.s. foreground) possibly for anvil or hammer footings. ML GPO Video Disk 1 06679 Sh 1884.

 In this section the original Bay numbers are used, 1-4, 4a and 5-15

The second building contained Bays 5-15, with Bays 5, 6, 7 and 8 comprising the erecting shop. A traverser ran the length of Bay 7 to facilitate movement of locomotives and rolling stock undergoing repair to the various working pits. Bays 9-11 were the machine and fitting shops where the majority of lathes, wheel lathes, hydraulic presses and rams were located. Bay 12 was the paint shop, Bay 14 the pattern and joiners shop and Bay 15 housed the locomotive stores.

The traversers located in Bays 7 and 13, were powered by their own small vertical or horizontal boiler. The overhead cranes, which served the erecting shop, were powered by a continuous rope which ran from the small 2-cylinder vertical steam engines mounted on the south wall. Forgings and castings from the first four bays could then be brought to the machine and fitting shop for final finishing and then transferred to the erecting shop where locomotives were assembled.

The machine and turning shop was powered by a line shaft and a series of countershafts again powered by the twin-cylinder steam engines on the south wall. Belts ran, usually, from the countershafts to lathes, shapers, grinders and milling machines which were located on the floor of Bays 9, 10 and 11. It is evident that wagons ran the length of Bay 9 and possibly Bay 11 from the forge and foundry delivering work for machining and removing completed work.

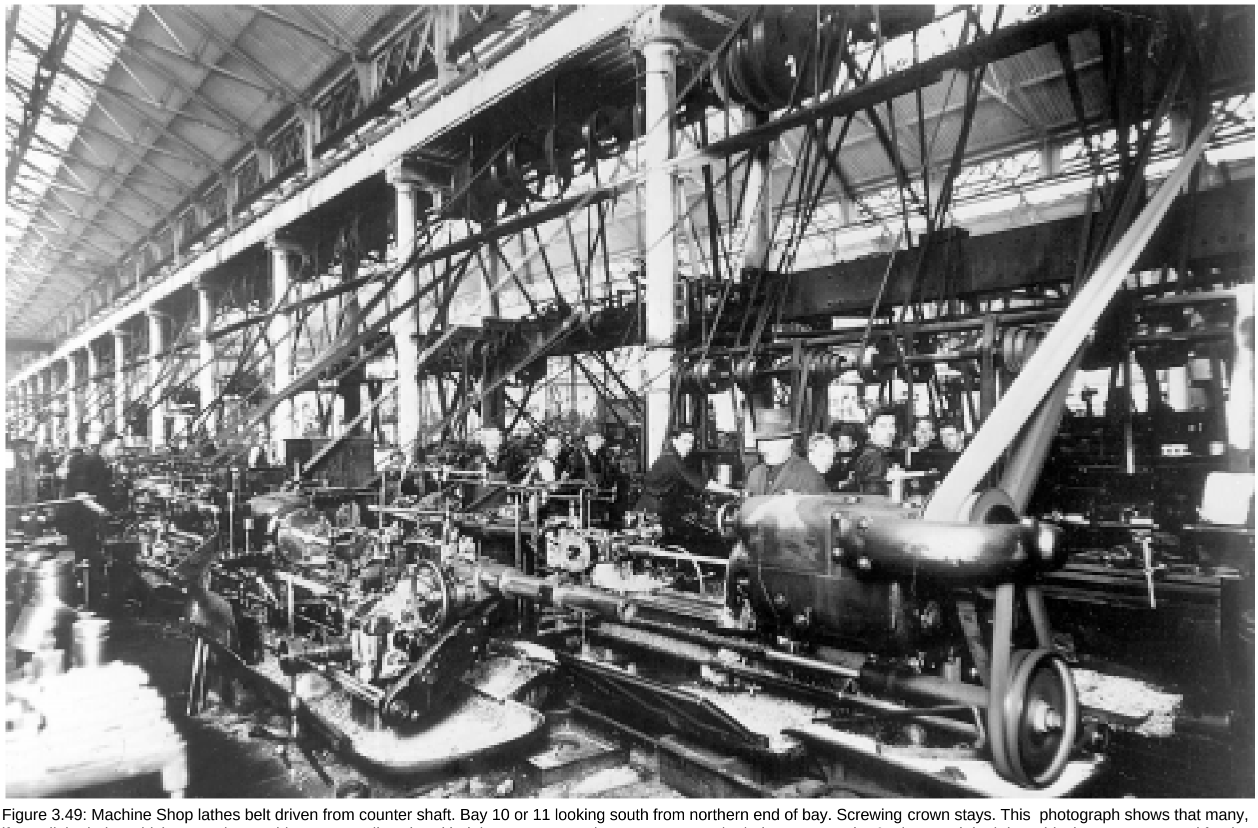


Figure 3.49: Machine Shop lathes belt driven from counter shaft. Bay 10 or 11 looking south from northern end of bay. Screwing crown stays. This photograph shows that many, if not all the belts, which ran to the machines, generally at head height,were uncaged. In some cases the belts appear to be 6m long and doubtless this, in part, accounted for the poor safety record of the early days of the workshops operation.Source: SRAO ELW 601/23.

3.6.4 Apprenticeships and Trades

Traditionally, there were four different ways of gaining formal qualifications in order to enter railway service. These were:

a) As a graduate. From the late 1940s, graduates could be offered cadetships, for example as a graduate engineer. Many graduates eventually became senior managers, senior engineers of heads of branches.

b) By studying for a diploma. Similarly to above, top level apprentices often commenced studying for a diploma and completed their studies at Technical College after the completion of their apprenticeships. This was also a path to top management.

c) As a clerk. Clerical staff often had a better knowledge of mathematics and English than the average and had as good a chance of promotion as any other railway employees. From the 1890s, clerks were able to study accountancy and other subjects relevant to railway operation at the Railway Institute.

d) As an apprentice. Dating from the mid 19th century, the traditional way of entering the railway service was at the trade level. The vast majority of workshops employees were tradesmen who had undertaken apprenticeships in the railways.

Apprenticeships

Individuals were apprenticed not just to the railways but to a particular trade and from their first day were allocated to a particular tradesman. Generally, each tradesman was allocated one apprentice. In some cases, for example in the Machine Shop, there could be more than one apprentice per tradesman. Railway apprenticeships were initially 5 years long but they were reduced to 4 years duration during World War II.

Apprentices travelled around to work in various locations so they could experience the railway service as well as learning their trades. Mr Ken Heard, for example, started his apprenticeship as a fitter and turner during the Second World War at the Eveleigh Locomotive Workshops. He then moved to both the Chullora and Clyde workshops and the Mechanical Branch drawing office before completing his training in the Water Service. Spending time in the drawing office was a useful step for an apprentice who wished eventually to be promoted beyond tradesman level, as the ability to read drawings was a valuable extra skill.

During the 1940s, apprentices spent their first week of training at the Railway Institute in Strathfield learning such basic skills as tool identification. They then commenced their practical training in the workshops. In addition to this, apprentices attended Technical Colleges and undertook trade certificate exams.

Until 1945, all notes and sketches had to be made by hand and apprentices' workbooks were marked on their correctness, including their correctness of grammar. Safety training was considered to be extremely important and was incorporated throughout the apprenticeship period.

Once an apprentice had "done his time", he became a tradesman and was given his own apprentice or apprentices to train. In addition, he would often be assigned one or two labourers who would assist in the workshops but were not studying to become tradesmen.

A tradesman's aim was often to proceed through the hierarchy, becoming a 'leading' hand, a sub-foreman and then a foreman. Initially, this progression was determined by seniority. In later years, however, extra training, exams and the self-motivation to learn more than just the basic job were required for promotion to be granted. Dependant on their skills and overall knowledge, tradesmen could progress to middle management. As they rose in responsibility, their skills in employee relations also became important.

Railway apprentices' training and study equipped them to work generally in industry, not just to complete a specific range of tasks. As a result, they were valuable as employees and were also able to find jobs outside the railways.

In 1955, 500 apprentices were being appointed per year in the Sydney, Newcastle and country centres and they received both practical and technical training. The technical training was run by the Department of Technical Education in technical colleges, at the Railway Institute and at the Railway School in Homebush. The latter provided practical and theoretical training for apprentice boilermakers, blacksmiths, car and wagon builders, fitters and machinists, electrical fitters and mechanics and signal electricians. Classes were often conducted during working hours and apprentices were paid for attending them.

Railway apprenticeships are now almost unknown as the railways no longer spend the money to train staff in this way, preferring instead to employ qualified tradesmen who have completed their apprenticeships elsewhere.

Figure 3.50: Three views of apprentices under instruction in 1955. Source: Dept. of Railways of NSW 1955: 259.

Trades Working at the Eveleigh Locomotive Workshops

There were many different trades employed at the Locomotive Workshops at Eveleigh. Below are brief summaries describing the different trades and where they worked within the workshops.

Carpenters:
Shown on a 1893 plan making patterns. Other woodworkers who were not involved in fine detailed or quality work.

Pattern Makers:
Highly skilled joiners who made timber models of items to be cast in metal. The patterns were then used to form the shape for casting.

Painters:
In 1893 painters were shown working on the locomotive side. By 1924, locomotives were being taken to the Paint Shop at the Carriage Workshops to be painted.

Metal Trades:
Were also known as ‘black trades’ because of the dirt involved in handling iron and steel. These include:

Fitters:
Fitters dismantled metal parts, checked them and reassembled them. Fitters also supervised other metal trades and they had the final say in the method of assembly of parts.

Turners:
Were similar to fitters, but specialised in lathe and fine machine work. Turners made parts, which varied from fine screws or bolts to major components such as crank shafts for diesel engines. Their trade was very important because a small mistake on a major component could cause either damage which was expensive to repair or a fault which led to an accident.

Machinists:
Came from the same background as fitters and turners, but specialised in particular types of machine work, such as milling, planing and grinding.

Boilermakers:
Boilermaking was seen as the dirtiest of the trades and the conditions in the workshop were noisy and at times uncomfortable. Boilermakers made not just steam locomotive high-pressure boilers but also pressure vessels for air brakes and water supply. Boilermakers were also expert riveters and they assembled and repaired steel underframes. Skill in the area was vital as boilermakers' work had to be able to withstand high pressures.

Blacksmiths:
A similar trade to boilermaking but blacksmiths specialised in making items of iron or steel rather than brass. Blacksmiths worked the steam hammers and other machines.

Copper & Tinsmiths:
Handled sheet metal as distinct from parts made of castings from heavy steel sheets or blooms.

Gas-Fitters:
Fitted gas pipes for lighting, and later heating, to carriages. Their work had to meet quite stringent standards due to the fact that the gases used on trains were invariably flammable. Standards for assembly were therefore very high.

Plumbers:
Could come from any of the 'higher' metal trades but were seen as a little lower down the scale than the above trades. Rail vehicles had water and compressed air-brake pipes, which needed plumbing skills to keep them in repair. Experience in pressure vessels was essential for railway work in both brakes and water supply.

Crane Drivers:
Crane driving was sometimes an unpleasant job as it involved being above the floor and at the beck and call of everybody on the shop floor. Crane drivers had to be experienced as one mistake could quite easily lead to the destruction of vehicles beneath. When a crane driver was away from the box, the workshop had no way to perform lift work, and the workshop had to cease operation for a time.

Electricians:
Electricians had to be good at mathematics and as a consequence were often good at a lot of other things.

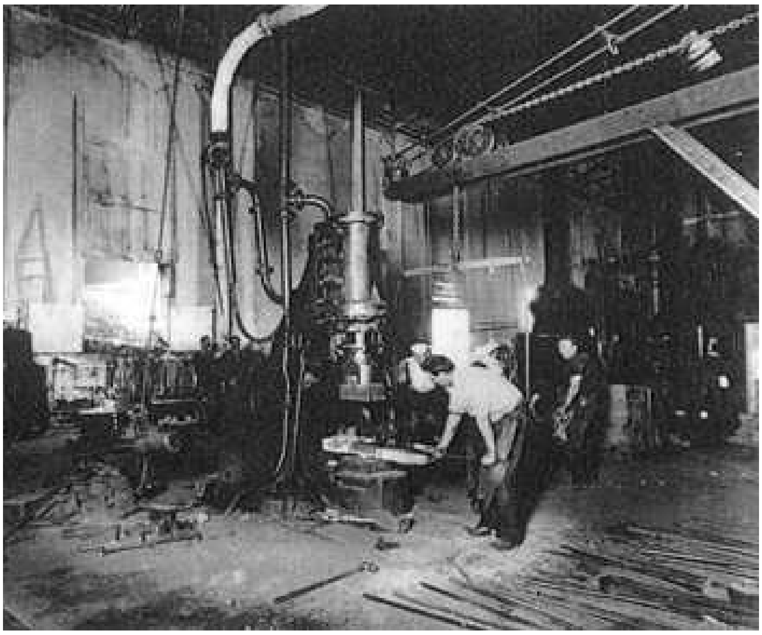


Figure 3.51: The work done in the Blacksmith's workshop or in any of the foundries was colloquially refered to as the "black trades". This photo depicts employees working working a steam hammer. Undated. Source: Sydney Harbour Foreshore Authority.

Figure 3.52: Many elements of the Locomotives that would eventually be cast in metal were shaped on wooden templates or patterns. Source: ML Picman Citation no.: NCY40/280 Home and Away - 17147

Figure 3.53: Erecting Shop in the Locomotive Workshops, c1886 with locomotive in foreground under repair. The locomotive is over one of the pits that ran across the bay. The photo shows the rope drive 1884 Craven crane and the workmen dressed up especially for the photograph. Bay 6 looking north from central road with traverser bay on l.h.s. (Bay 7).SRAO ELW 601/1 7

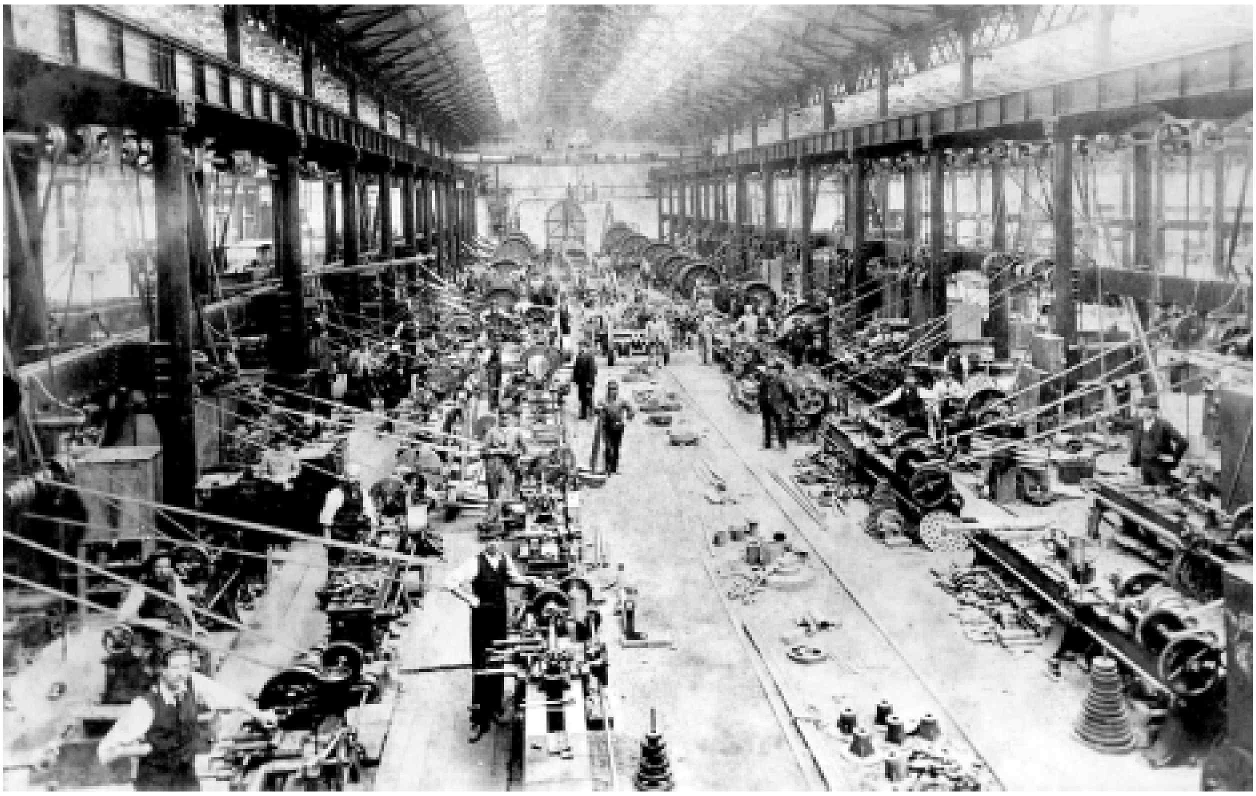


Figure 3.54: Wheel shop, Bay 9 looking south, showing wall engine on back walls l.h.s. The counter shafts are shown suspended under the column headstock with belts driving counter shafts fixed to the girders between columns. Machines were driven by belts directly off the line shaft or off the counter shafts. Note the wheels on the centre road and the overhead travelling crane. Source SRAO ELW 601/19.

3.6.5 Expansion

It became evident soon after the workshops were completed in 1887 that they would soon be inadequate for the amount of work that was to be undertaken on the railways. In the early 1890s planning was underway for major changes which would allow much greater output. By 1889 the large erecting shop had been added at the end of Bay 15. This massive shop then took over part of the work being done in Bays 5, 6, 7 and 8. At the same time, Bays 12 and 13 were converted to an interlocking shop to manufacture items of the railway safe working system. The traverser from Bay 7 was relocated outside Bay 15 to facilitate the movement of parts, locomotives and rolling stock between the workshops and the new erecting shop.

For some time Eveleigh had its own gas works, which were located near Macdonaldtown Station. A small generating unit had been constructed close to the running shed that supplied a small amount of electricity to both the workshops and the running sheds. However, in 1901 with the establishment of Ultimo Power Station, which belonged to the Rail and Tramway Department, electric power was made available to the workshops. Work commenced shortly after on the conversion of the rope-driven cranes to electric motor drives. Work also commenced on the replacement of the steam engines at the south end of the workshops by powerful electric motors. This, however, was not completed until 1914.

By 1902 the construction of new buildings was well underway. A new coppersmiths and tinsmiths shop was erected in a steel-framed corrugated iron clad shed on the south side of Bays 5-9 and the annexes located on the west end of Bay 4 were demolished. Shortly after, gable-ended brick walls were established between Bay 4 and 5 and this became Bay 4A. In 1907, the decision was taken to begin the manufacture of new locomotives at Eveleigh. To this effect, the new engine shop was constructed adjacent to the spring shop, which had been built on land at the eastern end of Bay 1.

By 1912 the foundry had been moved from the locomotive shops, and the machine and fitting shops had been enlarged, as had the boiler shop which now occupied Bays 3, 4 and 4A. It is evident from the 1912 drawing that much new machinery was introduced to both the machine and fitting shop and into the enlarged boiler shop. By this time, the new radial arm drills had been introduced, as had harder drill bits with the result that boiler shell rivet holes could be drilled rather than hot punched. This meant that the boiler forges in Bay 3 could be removed.

Figure 3.55: Bay 4a looking south-west showing rolling of tubes with pneumatic tube expanders to D53 class boiler. SRAO ELW 601/47.

By this stage also, the smaller work that had been completed within the blacksmiths shop was now being done in an annex erected in line with the coppersmiths and tinsmiths shops at the end of Bay 1 and 2, using pneumatic strikers.

A second steam hammer shop was built at the rear of the Spring shop which, according to the 1912 drawing, contained a series of very large steam hammers, two hydraulic cranes and furnaces. Such a workshop would have been necessary to supplement the work being done in Bay 1 for the production of new locomotives.


Figure 3.56: Workers made their own disposable hats out of folded newspaper to keep clean . Photo taken for "Century" Newspaper, no date. Source: ML Picman Citation no.: NCY40/292 Frame no.: Home and Away - 17159.

To supplement the forging capacity of the workshops, the massive 1500 ton Davy press was installed in 1925 with its own dedicated boilers and intensifier system. At this time, this was reputed to be the largest steam hydraulic press in Australia. It was able to complete work such as the manufacture of the massive steel chassis required for the locomotives being constructed at Eveleigh. The action of the press was a slow gentle push rather than the aggressive stamp of the hammers and its operation had a much gentler effect on both men and buildings than the large steam hammers.

By 1937, the whole of the workshops precinct was covered with buildings. Besides Bays 1-15, there was the new foundry, erecting shop, engine shop, the new pattern shop, the oliver smiths shop, plumbers, tinsmiths and coppersmiths shops, the wheel press shop, ammonia shop, first aid station, timber store, joiners shop, locksmiths, the garage, a greatly extended timekeepers building, the spring shop and the steam hammer shop, the compressor house and numerous other stores and ancillary buildings. Eveleigh had reached the peak of its manpower and its production. It was in this year that the Chullora workshops were established and the new permanent way workshops and the boiler repair workshops relieved some of the pressure on Eveleigh.

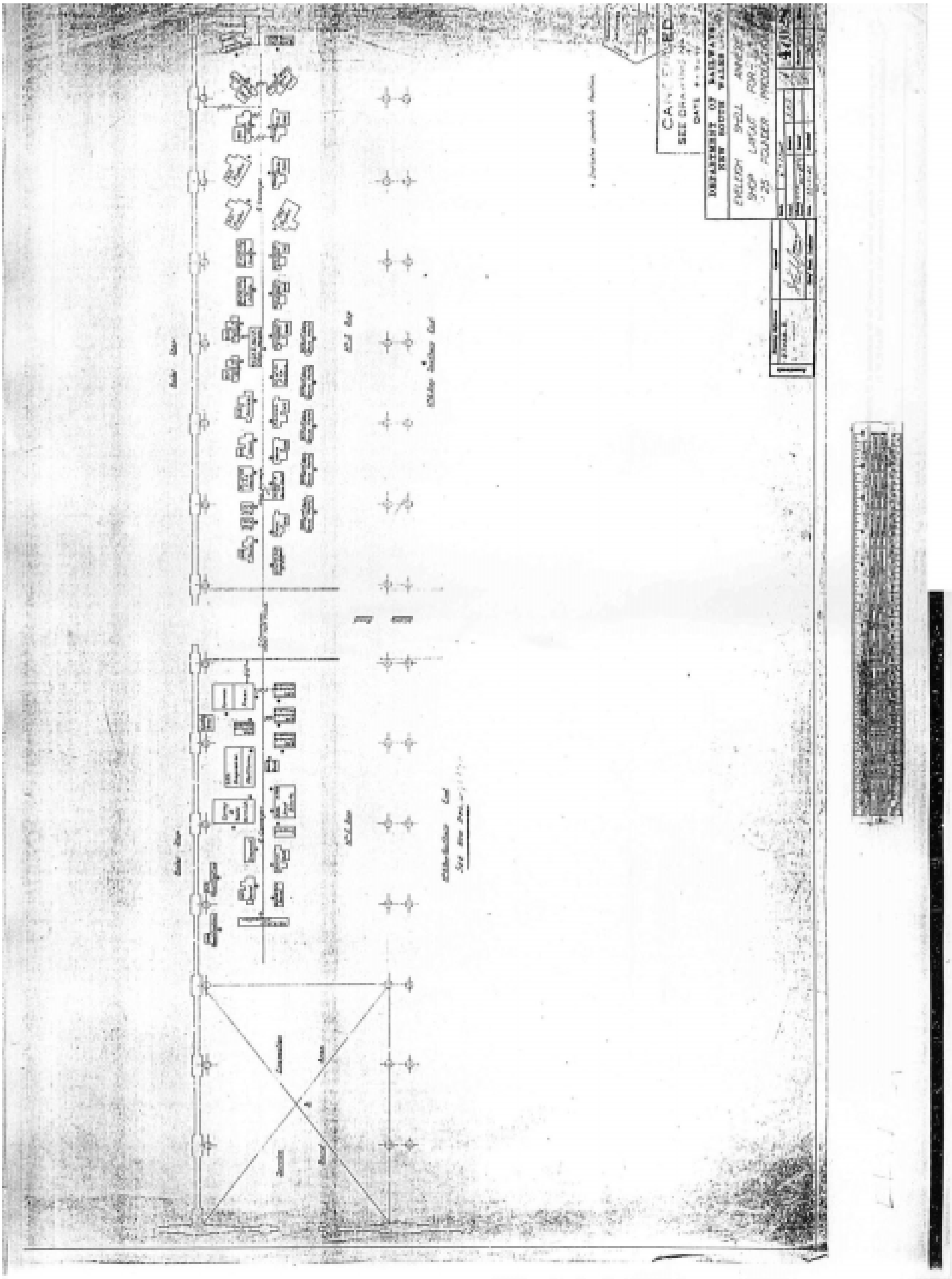
In this section the original Bay numbers are used, 1-4, 4a and 5-15

World War II & Post-War

During World War II, Eveleigh, like many other Government and private enterprises, dedicated part of its output to the war effort. Bays 5 and 6 were dedicated to the Department of Defence for the manufacture of 25 pound field gun shells (Plan 3.14 overleaf). In 1941, a mezzanine floor supported on timber columns was added to Bay 5 and the machinery for the manufacture of shells installed by February of that year. Other additions to Bay 8 were made and this became a munitions annexe.

During the period between the wars, and for some time after, the overhead line shaft became increasingly redundant as the new era of machines had their own stand alone electric motors with belt drive and eventually machines were designed with their own stand alone electric motor. The line shafts were gradually dismantled along with the counter shafts. Post-war locomotive manufacturing lasted only from 1945 to 1952, when Eveleigh became once again a repair and maintenance facility. The decision to abandon steam locomotives, taken in 1963, meant that Eveleigh, which was dedicated to steam locomotive maintenance and repair, entered its final phase.

The 1970's re-organisation and attempts at modernisation came too late. Too much of the machinery was suited only to the steam locomotive era. The spring shop was dismantled and the spring coiling section was moved to Bay 3 along with the heat treatment plant. Bay 5 mezzanine, which had been established during the war, became the staff canteen and was one of the few remnants of the war effort. The apprentices were located in Bay 6 north and the fitting shop occupied Bays 6 south, 7 and 8. The wheel and axle shop was located in Bay 9 while the adjacent Bays 10, 11 and 12 contained the machine shop. Bays 13 and 14 housed their air brake shop in their southern half and the tool room occupied the northern half of both bays. Bay 15 housed a rail motor test room on the north side and the storeroom remained in the southern half. However, the attempt at bringing Eveleigh into line with modern developments in rail transport was unsuccessful. The buildings contained old equipment and machinery which became progressively inappropriate to a modern transport era and the complex was closed in 1988.



Plan 3.3: 1941 plan of workshop in Bay 5 showing the layout of machinery used in the production of 25 pounder shells for WWII. This provides detailed evidence of the association of the workshops with the war effort. Source: SRAO ELW 31.

3.7 THE MACHINERY

3.7.1 General

The following section comments on the history of the machinery according to their method of operation - hydraulic, steam and belt driven.

Little documentary evidence survives of the plant and equipment at Eveleigh. Plant cards from the plant card system are missing, as is documentation assembled when the workshops closed. Searches of the material still located at Eveleigh and at the railway archives have failed to locate documentation which would help with the history of the machines. In many cases the only clue to the history of the machines including the date of manufacture or installation, is evidenced by the fabric of the machines itself. In some cases, the date of manufacture is cast into the machine (as in the case of the Craven Bros rollers), on to the name plate (as for the Craven Bros crane) or stamped on the small name plate screwed to the machine or motor (as for the Craven Bros electric motors on the 1907 crane).

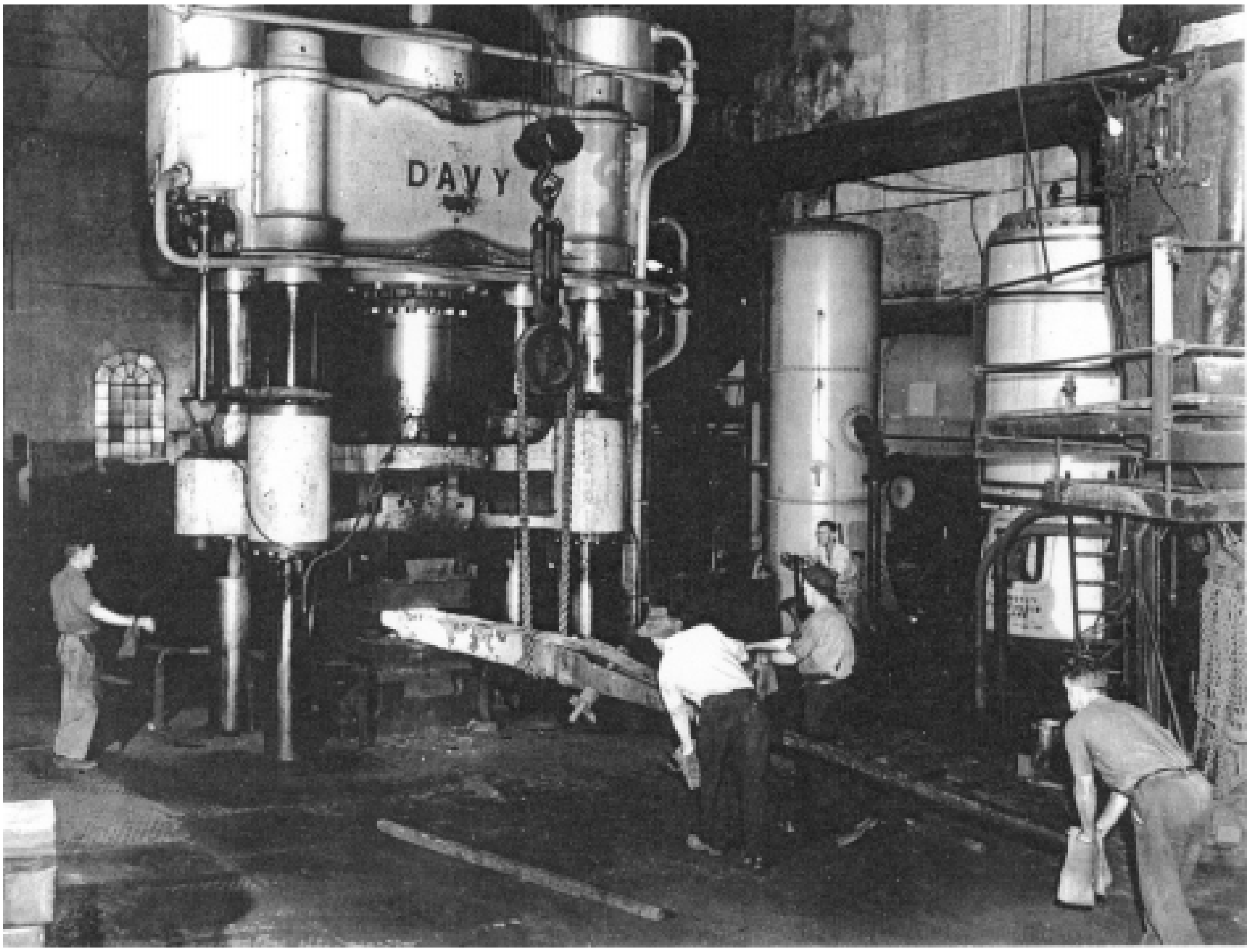


Figure 3.57: Bay 1 north looking north, showing Davy Press in operation. Supervisor on the left, operator at handle on right, pressing white hot metal manipulated by three men through balanced tongs supported from overhead crane. Note boiler on r.h.s. Source: SRAO ELW 601/29.

Heavy equipment was predominantly of cast iron with massive bronze bearings. There was no facility for an attached motor as almost all of the early machines (possibly up to World War 1) were belt driven from line shafts and counter shafts. Early machines were generally over-designed and components, which needed machining, were kept to a minimum. Later machines had facilities for the attachment of a separate motor to drive the machine by belt and later still, machines were designed with an integrated motor system. Later machines made great use of webs which were cast into the body of the machine and those produced after World War 1 and certainly after World War II were made of steel components which were welded together rather than being cast in a single piece.

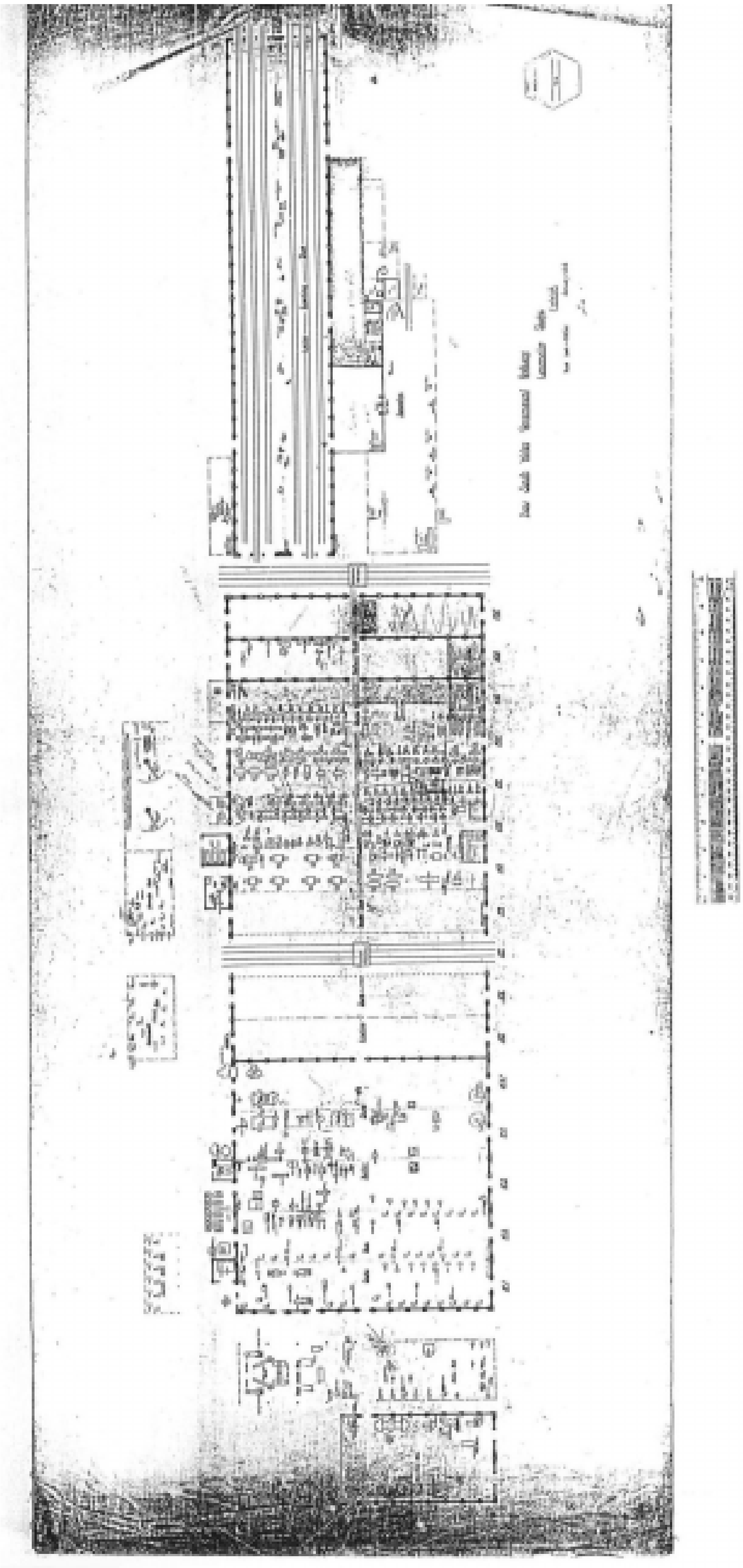
The early drawings of Eveleigh sometimes show accurate representations of machines, and it can be assumed that extant ones, if they are of the same configuration as shown in the drawing (and there is no evidence to the contrary), are in fact the machines depicted. Early photographs also provide evidence that some extant machines were installed at the time the workshops opened. Other machines are closely associated with the particular piece of plant and their date of installation can also be fairly accurately assumed.

As the historic record is so broken there appears to be little chance of producing a definitive history of the machines located in the workshops. Researching the oral history of the place could provide more information regarding machinery.

3.7.2 The Hydraulic System

The original hydraulic system in Annex 6 powered punches, presses and spring formers. The hydraulic system was installed when the workshops were established. The combined steam engine/pump had the same configuration as the one shown in the 1912 drawing (Plan 3.12 opposite) and it is probably the original which was installed to provide hydraulic power to the punches and formers in the workshop as well as the spring buckling presses, spring stripper and Ryerson spring formers. The hydraulic system is one of the earliest introduced into Sydney and precedes the 1891 Sydney and Suburban Hydraulic Power Company in Darling Harbour (now the Pump House Brewery) by some four years. This makes the hydraulic system the oldest still capable of being made operational in Sydney and possibly Australia.

In this section the original Bay numbers are used, 1-4, 4a and 5-15

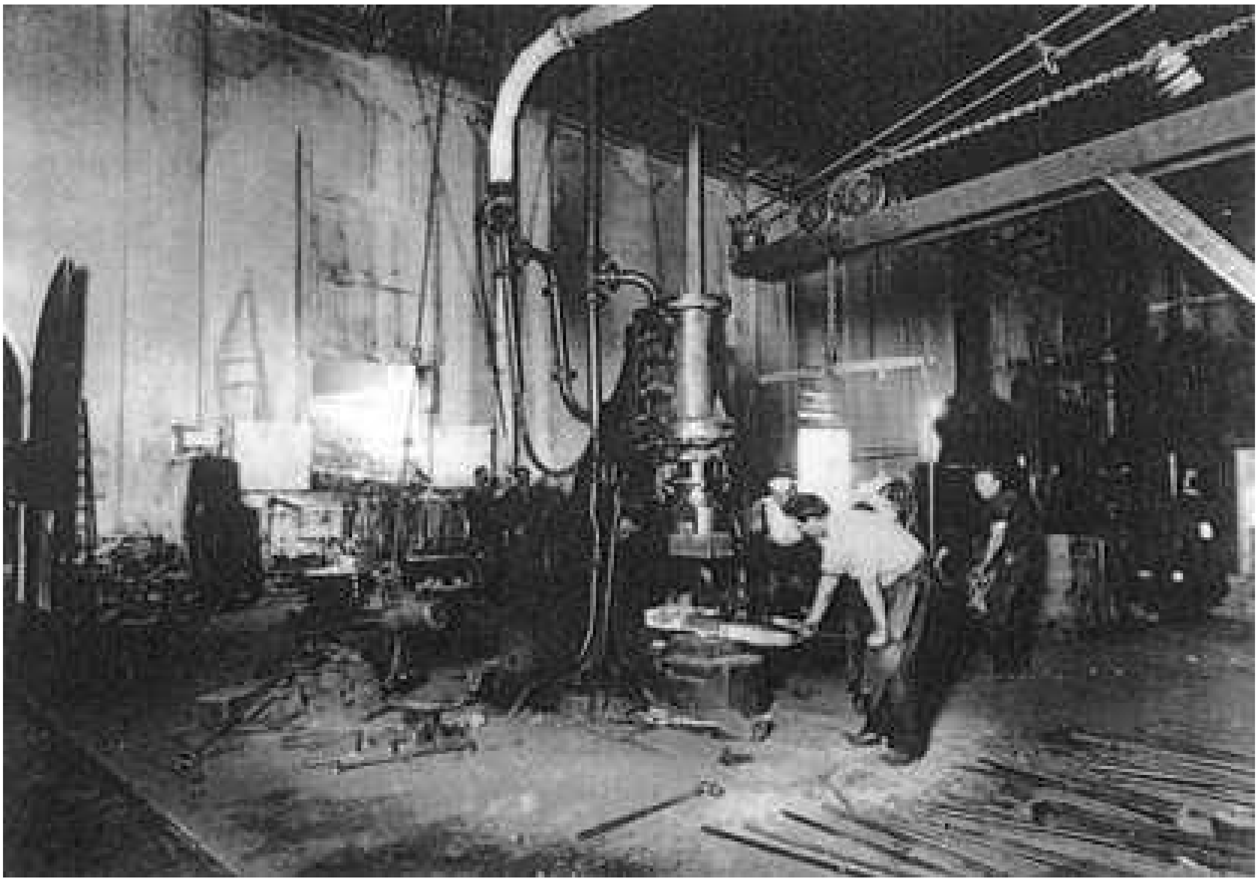


Plan 3.4: Plan of the Eveleigh Railway Workshops, in 1912, including the New Locomotive Shed, the Spring Shop and the Large Erecting Shed and adjoining new foundry.This plan shows the layout of the machinery detail at this time. Much of the information is only legible by viewing the SRA Archives apeture card. Some of the machines in Bays 1&2 are still in these locations. The machinery originally from Bays 3-4 are now in Bay 10 north (old Bay 9 north). Source: SRAO ELW 29.

The Hydraulic Engine House is Annex 6 at the southern end of Bay 3. Immediately to its west are the hydraulic accumulators. The reservoir and some of the hydraulic lines are likely to date from 1887, as the accumulator close to the building almost certainly dates from then. The electric motor is believed to have been installed some time immediately after World War 1, as was the second accumulator. Extra hydraulic power would certainly have been necessary when the workshops commenced building their own locomotives.

All the hydraulic machines probably date from last century. Every piece is massive cast iron and has the early form of hydraulic valving. However, little of this machinery would appear to be in its original location. Spring buckling presses were possibly located originally in Bay 4, as were the spring formers, and the spring stripper. They would have been moved to the new spring shop, which was built adjacent to Bay 1 along with the two spring presses by Ryerson. When the spring shop was demolished, all were returned to Bay 4. It is likely that the two hydraulic presses now installed in Bay 1 south were relocated from the old boiler shop probably from Bay 3 or Bay 4. The date of relocation can really only be guessed as knowledge of the operation of the workshop is insufficiently detailed to make an assumption.

Figure 3.58: Using one of the steam hammers in Bay 1. Source: Sydney Harbour Foreshore Authority.



 In this section the original Bay numbers are used, 1-4, 4a and 5-15

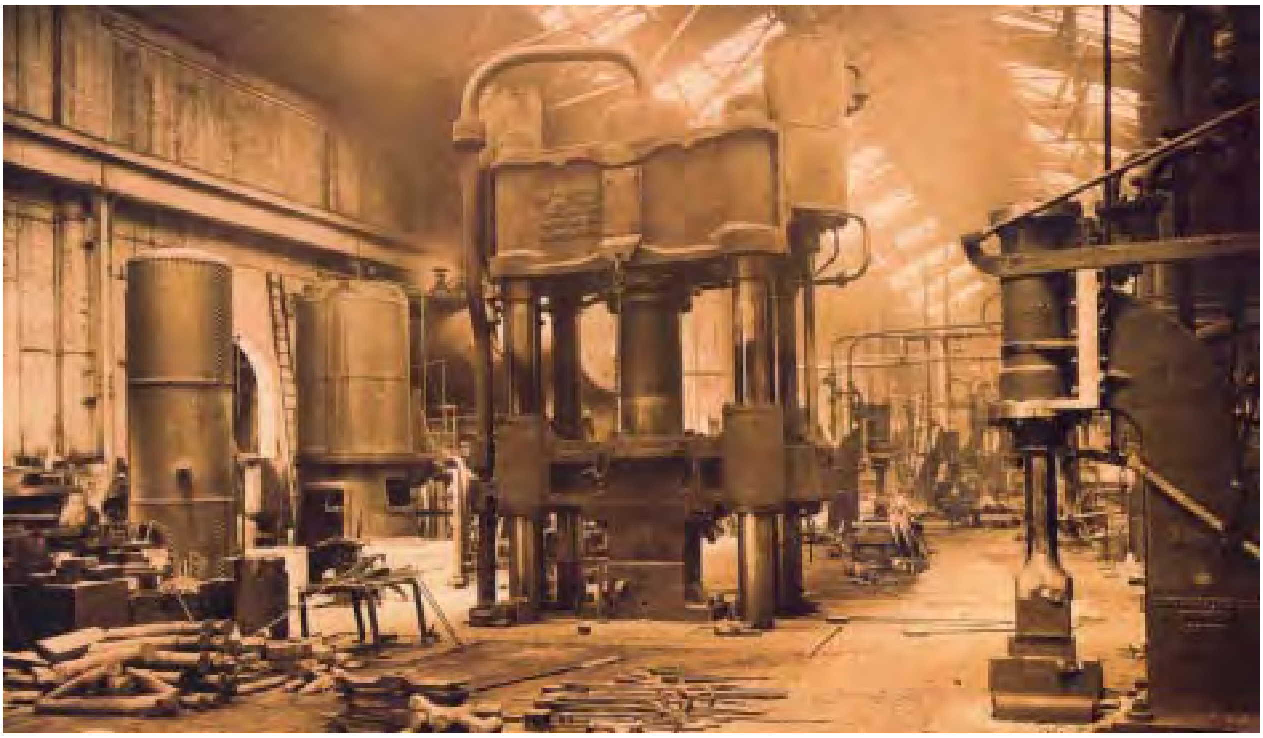
3.7.3 The Steam System

The massive hammers, presses and punches were powered directly by steam generated in boilers. The C36 class locomotive steam boilers which are now in the Annexe 4 on the south end of Bays 2 and 3 are the third generation of steam boilers in this location. Little is known of the two earlier sets of boilers. However, the present set would certainly operate at higher pressure than either of the previous ones and it is likely that when they were introduced the steam lines were also replaced. The six steam hammers (see section 4.6.3) which comprise the 40 cwt arch hammer, the 20 cwt steam hammer and the four 8.5 cwt steam hammers all appear to have been installed when the workshops opened. All appear to be in their original location. None have had any major alteration and all appear to be in operational condition.

The Rootes blowers located on the south wall of Bays 1 and 2 appear to be in their original location and although the two smaller ones may have been installed in the nineteenth century, it is believed that the most westerly was installed some time in the twentieth century. The machines are certainly early but there is no evidence of their date of installation. It is, however, certain that they have been in this location since 1912 and possibly many years before.

The Davy Press was installed in 1925 along with steam reservoirs and steam intensifiers. From photographic evidence, the south set of steam reservoirs was replaced possibly in the 1950s.

Figure 3.59: The Davy Bros. Press in Bay 1 north looking south. Taken some time after installation with the Davis and Primrose 8½ Cwt steam hammer in the right foreground with three steam hammers in the background the most distant one being the arch hammer. All steam hammers are shown on the 1912 plan. Source: SRAO ELW 601/43.



3.7.4 Equipment Which Operated From the Line Shafts and Counter Shafts

A variety of machinery was operated from the line shafts and counter line shafts that ran along the double row of columns between the bays.

The *Bretts impact punch* and *the De Burg electric shears* are both machines which could have been made to operate from their own attached electric motor or from a line shaft or counter shaft. Both appear to have been designed last century although they could have been designed early this century. Both appear on the 1912 drawing. The De Burg shears unit is shown as being in its present location adjacent to the rear wall of Bay 1 in 1912 while the impact punch has been relocated from Bay 3. It is possible that both machines were relocated from the old boiler shop, as a wall-mounted engine operated a line shaft, which powered some of the machinery in Bay 3. With the advent of electric power, these very heavy machines could be relocated to any position within the workshops as the power source could readily be attached to the chassis.

The *electric shears* and *plate rollers* were both located in Bay 4 south in 1995. Their original position is not known but both were probably originally powered from a line shaft or a counter shaft. Neither of the machines is shown in Bay 4 in the 1912 drawing and it would appear that they were relocated some time later with the extra versatility of layout that the introduction of electric power offered.

The *continuous forging machine* by the Ajax Manufacturing Company was installed in 1916. The machine was driven by a separate electric motor that may or may not have been supplied with the machine. It is likely, because of its configuration and operational requirements, to have been located in this position since it was installed.

The collection of *steel swages, fullers, and dies* which are located on what appeared to be the original tool racks between Bays 1 and 2 and Bays 2 and 3 possibly date from early this century or even late last century. However, as these tools wore out fairly quickly with continued use, it is possible that all of them have been remade. All of them appear to be in fair condition and are in their approximate operational location.

In this section the original Bay numbers are used, 1-4, 4a and 5-15

The *overhead cranes* throughout the workshops are in their original location. It was not normal practice to move a crane to a different location because of the wearing-in, which took place with each set of crane wheels and the overhead track. When the workshops closed down, it is believed all cranes were in operational condition.

The *wall cranes* are installed to facilitate the movement of materials from furnaces to hammers and other machines. However, very few drawings indicate the position of wall cranes. The 1912 drawings, for example, which contain so much information, show only the very large cranes located in the new steam hammer shop and in the wheel press shop.

Figure 3.60: Pouring molten metal into moulds. No date. There is a wall crane in the top left of the photo mounted on one of the columns. Source: ML Frame no.: GPO 1- 27772, GPO original location or series - st21659

3.8 ASSOCIATIONS

3.8.1 Designers

JOHN WHITTON

Figure 3.61: John Whitton, Engineer-in-Chief of the Railways of New South Wales, 1857 to 1890. Source: Lee 1988: 30.

Engineer-in-Chief, New South Wales Railways 1857-1890.

John Whitton was born on December 21, 1819 in Foulby, Yorkshire. Whitton's mother, Elizabeth Billinton, was from a well-established and wealthy family, but his father's lineage is obscure - at the wedding of Elizabeth Billinton to James Whitton, James' parents are listed on the marriage register as "unknown" (Lee 2000:35). It was a slightly unusual arrangement in that James Whitton, a "groom" (as listed in the Parish records), married a woman from the middle-classes but the most obvious reason for such a match is not evident – Elizabeth's first child was born almost two years after their wedding (Lee 2000: 37).

By the time John was born, almost three years after his brother Thomas, James Whitton had become a land agent, indicating that he had experienced a rapid rise in his social and financial status.

Whitton's older cousin, William Billinton, first took him on as an engineering apprentice in 1835. William had entered the fledgling profession a few years earlier and records show that by 1832 his professional occupation as a civil engineer was well established. John began his career at the age of 15 and by sixteen years of age had travelled to London to work with Billinton on the Wakefield Waterworks and Parliamentary plans, a move that suggests that he was a talented draftsman and surveyor (Lee 2000: 39). William Billinton also worked as a civil engineer for a number of railway companies and as his apprentice, John Whitton had many opportunities to experience not only the engineering aspect of his work, but also the political.

John Whitton then moved to the Lancashire and Yorkshire Railway under the employ of the then John Hawkshaw (later Sir John) in 1847. Hawkshaw was undertaking the massive job of laying a railway through the Pennines and it was during this work that Whitton became a firm proponent of consistent gauges with a preference for the narrow type. Later in New South Wales, the issue of gauge size would create friction between Whitton and his Governor and government. It was during this time with the Lancashire and Yorkshire Railway that the locomotive superintendent of the rival Manchester, Sheffield and Lincolnshire Railway, Richard Peacock, became known to Whitton, even if only on the basis of reputation.

In this section the original Bay numbers are used, 1-4, 4a and 5-15

The issue of gauge sizes was a pivotal one in Britain and Australia. In Britain, the “battle of the gauges” (Lee 2000: 81) fought in the mid 1840s was between the smaller type championed by George and Robert Stephenson and the larger 7 ¼ foot gauge adopted by Isambard Kingdom Brunel. The smaller “Stephensonian” gauge won out because it was more widely used, thus universality of gauges would be easier to achieve (Lee 2000: 81). This “battle” would be fought in Sydney as well with John Whitton pushing for a universal gauge of the smaller variety.

Whitton’s next move two years later, was to John Fowler at the East Lincolnshire Railway 1848. Fowler was to eventually move his work to London where he was to become famous as the “builder of London’s Metropolitan Railway” in the late 1800s as well as receive a baronetcy for that work. In 1852 Whitton went on to work for the Oxford, Worcester and Wolverhampton Railway Company (OWW) with Fowler where he was appointed Resident Engineer to Fowler’s Chief Engineer. Both men earned great respect in their professions and were called upon to work and comment on many railway construction jobs. Thus, Whitton’s professional associations and his experiences in railway construction in Britain put him in an excellent position when the Engineer-in-Chief’s job for the Great Northern Railway became available in 1855. Whitton applied and was short-listed but lost the job to Walter Brydone who had worked for the Great Northern Railway previously. Three months later he was offered a job as Engineer-in-Chief on the railway in the colony of New South Wales.

In July 1856, John Whitton married Elizabeth Fowler, sister of his colleague and friend. Two months later the Whittons were on their way to Sydney where John would begin his work and go on to become responsible for the laying of over 1,000 miles of new railway track across the state.

The idea of a railway made a great deal of sense in a colony the size of New South Wales that by British standards, was sparsely populated and had distant outposts. Whitton was in charge of connecting these outposts and transporting the, up until now, unexploited reserves of coal and shale to their next destination. While in Britain Whitton had enjoyed a high degree of prestige and authority, but that authority and judgement came into question after the fatal head-on collision at Emu Plains in January 1878.

The Emu Plains accident marked the start of Whitton's subsequent political battles and in particular, the fight to preserve the reputation he had made for himself in Britain and in New South Wales before railway system outgrew it. The issue of the smaller "Stephensonian" gauge was questioned and found to be inadequate for the increasing load from primary industry. What followed was a reshuffle in the Railways that saw Whitton's supporters demoted or sacked (Lee 2000: 243). The political aftermath of the Emu Plains crash created the perfect climate to use Whitton as a scapegoat for many of the ills of the NSW Railways – a role that Whitton unwittingly reinforced with his refusal to compromise his vision for the railway of NSW.

Whitton's vision for the NSW railways was as an integrated system – "a radial network centred on Sydney" (Lee 2000: 258). Henry Parkes, leader of the opposition, had Whitton speak in parliament against creating new and competing rail lines – the motion was defeated. His ideas failed to progress with the increase in railway traffic to the point where the existing components such as rails, were not adequate to service the growing usage of the railways, particularly by heavy industry. In this sense, Whitton can be seen to be the architect of his own demise because he refused to budge on principle. John Fowler also had a connection with Australia, acting as adviser on some projects and visiting in 1886 where he stayed with Whitton. While in Sydney Fowler sketched a bridge over Sydney Harbour and showed that it could indeed be bridged, although that idea was not taken seriously for some decades to come (Fowler was then working on the Forth Bridge in Edinburgh). Fowler's involvement in NSW Railways was seen by some as an exploitation his relationship with Whitton (Lee 2000:321).

John Whitton died in Sydney on February 20, 1898 aged 77 years. He outlasted his friend and peer, John Fowler by three months.

GEORGE COWDERY

Chief Engineer for Existing Lines and Tramways 1880-1890

Cowdery, born in 1830, was the son of an English railway engineer who worked for private contractors Betts & Macintosh. As a child, he travelled extensively around England as his father moved from site to site. Cowdery started work, at the age of 14, for Sir Samuel Moreton Peto, of Brassey, Peto & Betts, a construction company, which specialised in the building of bridges and railways. He worked in the drawing office and went out on the lines with the Engineer measuring up and setting out.

When working in North Wales on the Chester and Holyhead Railway, Cowdery met Robert Stephenson who was building the tubular Britannia Bridge over the Menai Straits.

Cowdery next worked on the Oxford, Worcester and Wolverhampton railway for Brassey, Peto & Betts. It was here, during work on timber piles for large timber truss bridges, that he met John Whitton and John Fowler, both of whom employed him later in New South Wales.

The timber truss bridges were experimental designs by Brunel. Cowdery also worked on tunnels, stone viaducts, sea walls, light houses and pier heads. Cowdery would have been familiar with an earlier, 1819-26, suspension bridge over the Menai Straits designed by Telford and regarded as a masterpiece of elegance and design (Copplestone) with brilliantly detailed iron work. Both bridges are regarded as landmarks in the development of iron structures (Copplestone: 305).

Work became slow in England because of the Crimean War and Cowdery came to Australia in 1856 with letters of introduction to the Governor of Victoria. Cowdery first found regular employment constructing roads and surveying new railway lines in Victoria and travelled to NSW following the awarding of the contract for the Menangle to Picton line to his former employers, Brassey, Peto and Betts. He worked on the Great Southern Railway at Douglas Park and John Whitton appointed him District Engineer of the Great Southern Railway in 1863.

Cowdery built the first two long railway tunnels in the colony as well as six large viaducts on the Great Southern Line. In 1868 he was transferred to work on the Great Western line and supervised the completion of the famous Zig-Zag line at Lithgow. In the early 1870s railway work almost ceased and the lure of gold at Hill End caused Cowdery to abandon the railways temporarily. He worked for a time as a mining engineer and also surveyed the mines and published a plan. He returned to the railways working on the lines beyond Goulburn then Grafton to Glen Innes, then Orange to Narromine.

In 1878 Cowdery was appointed the Deputy Engineer for Existing Lines in New South Wales and in 1880 he was appointed Chief Engineer for Existing Lines and Tramways. In the late 1880s he began to plan the Eveleigh Railway Workshops and it is Cowdery's signature that appears on the contract drawings for the Carriage and Wagon Workshops.

George Cowdery retired in 1890 and died in 1913. His son George Robert, later became Engineer for Tramways, a post he held for 37 years.

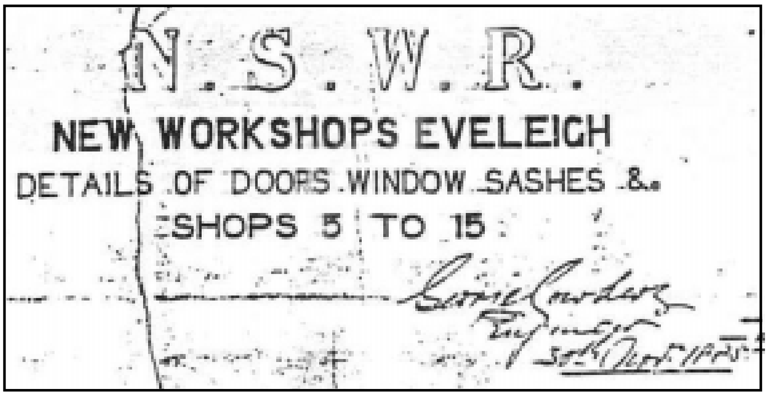


Figure 3.62: George Cowdery's signature appears on the plans for the Eveleigh Workshops. Source: Detail of SRAO ELW 22).

 In this section the original Bay numbers are used, 1-4, 4a and 5-15

WHITTON & COWDERY AT EVELEIGH

As Sydney expanded, so did the need for railway workshops to cope with the maintenance and repair of the rolling stock. By 1875, the Government bought the Chisholm estate adjacent to what was then Eveleigh Station and today is Redfern. The workshops retained the name Eveleigh. After the 1878 re-structuring when Whitton witnessed the demotion of his men, his own responsibilities were diverted to new construction and Cowdery became the Engineer for Existing Lines. The Existing Lines Branch looked after everything to do with the permanent way including design & construction of new lines and all new buildings. The separate Locomotive Branch was responsible for all aspects of rolling stock.

Funds for various projects were obtained from different sources: Cowdery's budget came out of rail revenue while Whitton had to rely on parliamentary decisions for his projects. Although the Eveleigh workshops were technically New Construction, they were going to be built on existing lines as a replacement for the existing Sydney Yard, and the responsibility that Whitton thought would be his, fell to Cowdery. In 1881, construction on the new Eveleigh workshops began. Whitton and Cowdery began as friends who respected each other professionally and ended as rivals with Whitton increasingly critical of Cowdery's plans for Eveleigh, and Cowdery critical of everything that Whitton undertook from then on (Lee 2000: 263).

There was conflict between Whitton and Cowdery over the cost of the Eveleigh complex, Cowdery's choice of a Whipple truss bridge at Lewisham, the design of Whitton's iron girder bridges and his timber viaduct over the Murrumbidgee flood plain at Wagga Wagga. Whitton considered the running sheds extravagant but comparison by Goodchap with the costs of inferior American sheds vindicated Cowdery. In April 1884 a Royal Commission was established to "investigate the rival claims of the Engineers". The commission could not fault Whitton's designs but it was Cowdery's plans that were implemented. Cowdery appears to have retained his position despite his obvious, and very public, difference of opinion with Whitton.

3.9 COMMUNITY ESTEEM AND VALUES

One aspect of the significance of a heritage site is the role the place played in forming cultures within the confines of its walls and the effect outside the strict boundaries of work. By nature of the size of the place, the people who made the Eveleigh Workshops function – from the Blacksmiths to the Electricians – became part of a sub-culture that had its own rules beyond those dictated by official working conditions. In volume II "Social and Oral History" of the *Eveleigh Workshops Management Plan for Moveable Items and Social History*, Lucy Taksa defines "social history" as "the history of ordinary people" (1996vII: 1), the significance of which is the collective and often profound affect on a place that is not a direct consequence of the management directives but the stories of the workers. The experiences at Eveleigh, as told by the workers themselves, augments the functional analysis of the site, as it is the workers who operated and maintained the machinery that manufactured and maintained the carriages and engines. Likewise it was the workers, represented by unions, who took action to improve health and safety and pay and other conditions of work. Eveleigh "provided the ground for struggle, as well as a contested terrain where workers used their community networks and their class identity to negotiate the power of the state and railway management as well as differences amongst themselves. In doing so, they remapped the ground on which they toiled and lived" (Taksa 2001: 231-237).

ORAL HISTORY

The information required to obtain an understanding of the "history of ordinary people" is often found within the memories of people with experiences of the site. Volumes II and V, "Social and Oral History" and "Oral History Transcripts" respectively, of the 1996 GML reports on Eveleigh, are concerned with presenting and analysing the oral histories collected during the course of "Back to Eveleigh" days and subsequent interviews. The stories in the transcripts communicate the feel of the place and give a perspective of the space and the activities therein. Conventional history gives an account of procedures and processes, e.g. "1955 The Machine Shop, which now occupied seven bays, provided 7,000 separate items per year in addition to the milling and machining of parts for the repair of locomotives" (CMP 2002: 48); The oral histories present first impressions of the place as "overwhelming…a huge place, so noisy, so much activity, so many people around" (GML v.V interview with Jack Bruce).

Figure 3.63: Lucy Taksa on the left collecting oral history from a former employee at a "Back to Eveleigh" Day. Photo: Jean Rice c.1998).

John Willis recounts that he'd wanted to go and see the steam engines since he was a little boy and when he did gain employment at Eveleigh he remembers, *I looked at the place, my first real look at it and I ran away. Yes, really. It frightened me…No, no. It was frightening because there was so much going on. So much movement. Straight away you thought "Oh, I'm going to get run over"* (GML v.V interview with John Willis). The impression of the workshops for the uninitiated - the noise, the heat, the perceived mayhem that is not apparent in the documented sequence of events at Eveleigh, is conveyed in the words of the interviewees. Long after they became accustomed to their working environment, the men remember how the place first appeared to them.

The old Locomotive Workshops, now the Australian Technology Park (ATP) has been regularly hosting "Back to Eveleigh" days. The event attracts people outside the railway profession for a number of reasons, some of which are mentioned in the Statement of Significance. However, as unpleasant as some of the events and working conditions were, the popularity of Back to Eveleigh Day with former employees from the Locomotive and Carriage Workshops and their relatives, and their willingness to reminisce is a testament to the impact the place had on their lives. Workers identified predominantly with the workshop that they were employed in, social events were organised along the same lines as were the regular union and political meetings. When required, such as for industrial action, both sides of the Eveleigh Workshops would unite. Hal Alexander, former employee and member of the Communist Party at the Carriage workshops mentions that "*there was a bit of jealousy about the loco side and the carriage side. There was a dozen train tracks in between but it could have been a mile wide. I only mean that in a peripheral sense. In the real sense there was unity between the workers"* (interview with Hal Alexander GML v.V).

The transcripts of the interviews provide evidence of the importance that the place had in people's lives in many areas including politics, careers and apprenticeships. It becomes clear that working for the Railways was a way of life with workers setting family career trends: "…*anyone who worked in the Railways who had that idea about permanency or when their sons grew up they also would become Railway workers because it was a guarantee of some sort of permanency in life were called Railway Dans"* (GML 1996 v.V interview with Hal Alexander).

Brian Dunnet started with the Railways in the 1950s and comments that his career decision was based largely on his familiarity with the Railways. In his interview with Joan Kent, Mr. Dunnet begins with an explanation for his decision to apply for work with the Railways:

Well, I came from a Railway family but at that time there were general applications for jobs and I made a few at that stage…but the Railways was made a consideration because I came from a Railway family background, both my father, a number of uncles and grandfather, people like that, had worked at various stages with the Railways – had been long careers in some cases (GML 1996 v.V).

Bob Matthews who worked at the Eveleigh Locomotive Workshops from 1940 to 1966 also followed in his father's footsteps:

I was born in Condoblin on 19.6.1919…My dad was working on the railway and that's where I was born. When the line was completed he was then moved to Parkes where I attended school and also started my railway career as an apprentice at the workshops at Parkes…In 1966 I then went into the New South Wales Government Railways Ambulance Corps and I worked in there until my retirement and I ended up as the General Secretary of the Railway Ambulance Corps [GML 1996 v.V].

John Willis was another "Railway Dan" starting at age 16 in 1949. Mr. Willis' father started at the Eveleigh Locomotive Works and stayed for forty years, followed by four of his sons, one of whom was John. During the 1940s the Railways was seen one of the more stable employment options that had better working conditions than other jobs so it was not uncommon for sons to follow their fathers into the job. Conditions at the Eveleigh workshops were difficult and there is no doubt the work was exhausting, but the work was perceived to be stable and the hours were set. Families could organise their day's routine around the job. John Willis says:

Yes, I think she [mother] *was happy because she knew what time he'd be home because with the wool wash they'd work anything up to fourteen hours a days* [sic]*, so this way it was just a straight eight hour shift and she knew what time he'd be home, what time to get the tea ready and what time the boys had to be in for tea and to line you up for your bath. She liked it* (GML v.V).

Eveleigh was the starting point for many workers as young men undertook apprenticeships, often before they finished school. Not surprisingly, as many people who began with the railways lived out their working lives with the railways, their social activities often centred on the workplace. John Robert Bruce joined in 1940 as an apprentice coppersmith and spent his working life with the Railways, most of it at Eveleigh. He describes social aspects of working at Eveleigh:

When I first went back to Eveleigh I was invited to join an officers social club…we used to have marvellous harbour functions twice a year. We would get a ferry and load it up with kegs of grog, buckets of prawns and meat prawns and all these sorts of things. We'd have one close to Christmas which was a family one with wives and husbands, and a bucks one in the middle of the year, on these ferries….[The Picnic Days] *were different from these one* [sic] *that were personally organised. The annual picnic was more management inspired. We had volunteers who worked practically the year round doing bits and pieces to organise the annual picnic. And there were two of those. There was the workshop picnic was for everybody, all grades. And then there was the officers* [sic] *picnic. And that didn't just entail Eveleigh workshops it was all salaried staff right though. Both good functions. Both very well run. Very good for the children and the employees* (GML 1996:vV)

Eveleigh has been credited as being pivotal in the Australian Labour Movement, with the formation of the Amalgamated Railway and Tramway Service Association (ARTSA) in 1886. ARTSA was the first union relevant to the Railways that represented a large proportion of the unskilled labour. It was conceived by two porters, William Schey and J. Cavanagh, who realised that many of the unskilled workers such as the Signalmen and Guards all had similar work issues that could be resolved with a more unified approach (Hearn 1990: 18). Until the formation of ARTSA, the only successful unions were those that represented specialist groups with large membership like the Boilermaker's Society (Hearn 1990: 18).

Although Australia's involvement in WWI was initially supported by the workers at the Eveleigh Workshops, the heavy casualties suffered by the ANZACS created a more critical atmosphere within the working classes. Combined with, and as a consequence of, the horrors of the war, working conditions at Eveleigh were deteriorating. "The brutal war of attrition being fought in France demanded a constant supply of men, and Australia's Labor Prime Minister, Billy Hughes, believed that conscription was the only way to maintain adequate numbers of recruits" (Hearn 1990: 27), the effects of which were felt at Eveleigh as in other places. ARTSA instigated a "no conscription" campaign which resulted in a "no" response to two referenda.

With the working class community increasingly questioning Australia's involvement in the war, perhaps 1917 was not the ideal time to introduce the Taylor Card System to measure efficiency and cost. James Fraser, the Acting Chief Commissioner introduced the Taylor system into Eveleigh in an attempt to 'streamline' production and measure worker's performances. ARTSA reacted to this by claiming the system would act to dehumanise workers and make a monotonous job worse. The system was introduced at Randwick Tram Shops, followed swiftly by a failed attempt at arbitration. On August 2, 1917 1100 workers at Randwick downed tools and walked off the job. Three thousand workers followed suit at Eveleigh on the same day. The strike spread to other railway workshops at Clyde, Newcastle, and Goulburn and by the end of the strike 82 days later, an estimated ninety eight thousand workers had walked off the job, over 77,000 of them in NSW (Taksa 1996: 32, Hearn 1990: 29).

One of the effects of the strike was to consolidate the feelings of solidarity amongst many of the worker's families. Stan Jones the son, cousin and nephew of Eveleigh workers:

…the families of the strikers became closer to each other and the families of those who didn't go on strike correspondingly became closer too. One had a feeling of being in the fight and the others had to some degree feelings of guilt…Not that there were too many who belonged to families whose men did not take part in the strike (Stan Jones in Taksa 1996: 33).

While the duration of the strike and the numbers involved is impressive, the ultimatum issued by the government that workers return to work or lose their jobs resulted in 1,300 workers picking up their tools again. In order to bolster worker numbers, the government brought in schoolboys from SCEGS (Shore) and Newington College as well as volunteer labour from rural areas. The strikebreakers became known as Loyalists and the strikers, Lily-whites. As powerful a message as the strike may have sent, the result was that the card system was retained and returning strikers were stripped of any seniority they may have had as well as their superannuation rights. Many unions were deregistered and working conditions became harsher than they were before the strike and remained that way until 1925 when the NSW Premier, Jack Lang upheld his pledge to restore striker's positions (Taksa 1996: 35).

The reverberations of the 1917 industrial action were felt by generations of railway workers whose fathers or grandfathers had been involved:

…part of the industrial muscle of the Eveleigh area was the fact that they could put on a demonstration outside of Parliament in half an hour or so, which they could do very effectively. …A lot of the major forces that were involved at that strike, whilst it started at Randwick, it very quickly spread into the Eveleigh shops. But the ghosts of that, and the aftermaths of that, were still very much alive in 50s and the early 60s. By that I mean, as a young worker, people would point out to you people who had scabbed during 1917, were still being ostracised… In fact, there were still people who had joined the National Union of Railwaymen – the scab union that was formed – was still alive, very much so, in the 1950s and those people and those members of that particular union would be made known to people coming in to the Railways and there were a lot of grievances of 1917 were still being carried on the early 50s (GML 1996: v.V interview with Brian Dunnet).

Finally in 1932, the Lang Government abolished the Taylor Card System. However, the abolished system was replaced with time sheets, which were overseen by "Irregularity Clerks". If time could not be accounted for a "bung" was administered:

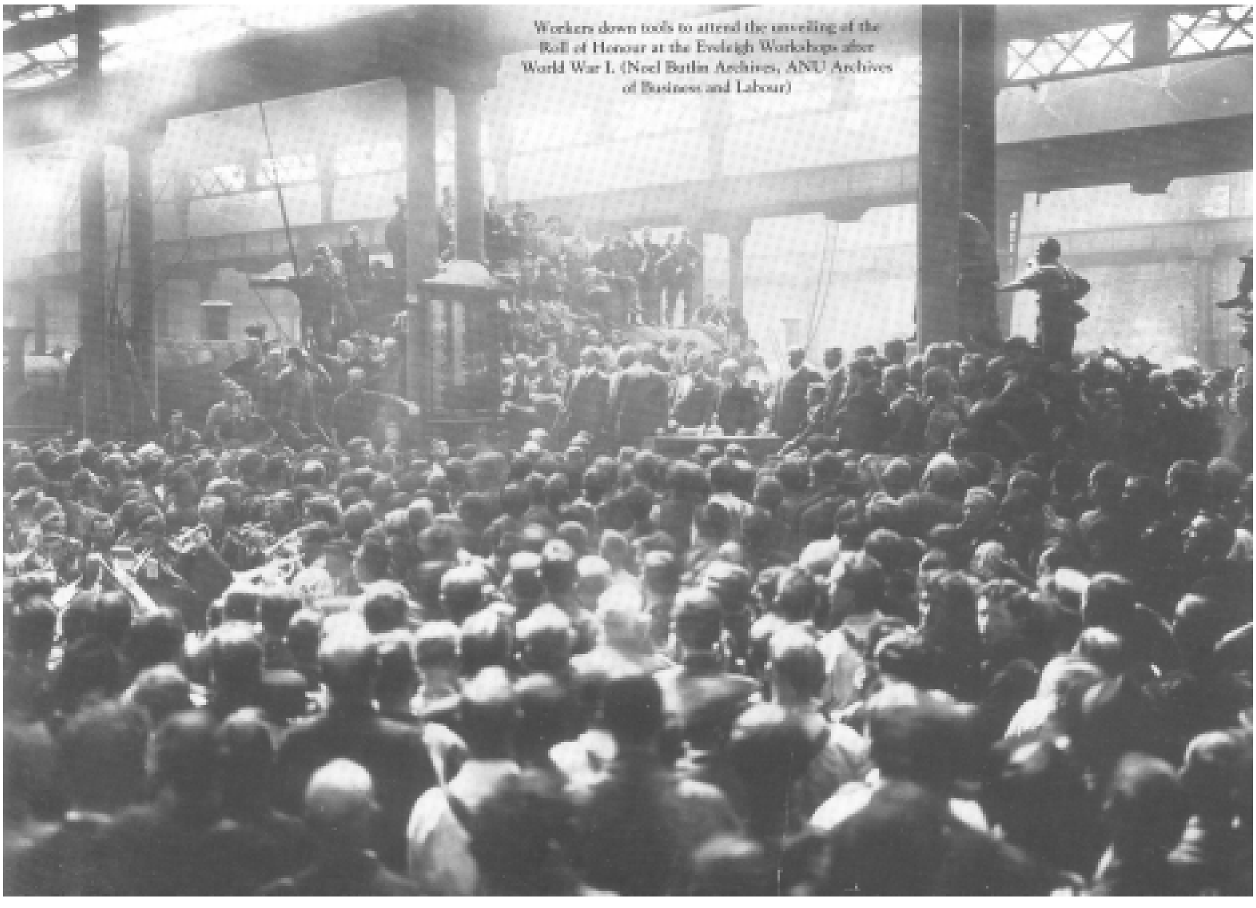


Figure 3.64: The caption in the photo reads: *Workers down tools to attend the unveiling of the Roll of Honour at the Eveleigh Workshops after World War 1. (Noel Butlin Archives, ANU Archives of Business and Labour).* Source: Sharpe 1999: 81.

Bungs came down through administration. Bungs were issued for all types of misdemeanours. A bung was a 'please explain' and they had the great technique of being able to fit you with a huge number of charges for the one offence (Jack Bruce in GML 1996:v.V).

Once called on a 'bung', an employee had to provide a written explanation for the time wasted and more than likely get their pay docked and the 'bung' recorded. An article from a 1954 edition of the Eveleigh News took on the issue of 'bungs':

The number & nature of Bungs being served on employees is growing daily. One would think that the Department wants to get rid of employees instead of urgently needing them. In the Machine Shop a Driller was Bunged for early washing. He answered the Bung & clearly showed that he was innocent of the charge. This reply just spurred the Bung merchants on to greater efforts, they issued him with another – Bung – Charging him with Idling his time from 3.55pm to 4.5pm [sic]*…In the Boiler Repair Shop an employee, who cuts the ends of Tubes, was away from his machine. The employee explained that it had been a practice* [sic] *for the past 30 to 40 years for the operator of the machine to take the blade & have it sharpened when necessary…The following day he received a Bung. Charges were (1) Idling his time & (2) Being away from his working location. Another two employees, working in the same Shop received similar Bungs. Their reason for being away from the job was that unusual and apparently unnecessary – according to some people – human function which makes it necessary to go to the Lavatory* (Taksa 1996: 41).

With working conditions being what they were, along with its strong history of unionism, it is not surprising that the Communist Party recruited a large following from the Eveleigh ranks. Shop committees, the first being formed in the late 1920s were a platform for communism at Eveleigh. They were formed in order to create links between the different unions and to "physically bring together the members and officials of the twelve unions that operated at Eveleigh" (Taksa 2001: 19-21). "As communists, these people also saw the shop committees as the best tool for minimising other divisions that existed among the different religious, occupational, union and administrative grouping, which prevented concerted industrial activism" (Taksa 2001:19-21).

Even as late as the 1940s, management was viewed by some of the workers as the "ruling classes". In the words of Hal Alexander:

It meant that we had some illusions that one day the Shop Committee movement would turn into workers Soviets [sic] *where the workers would seize control of power and operate the industries for themselves and not for the ruling classes. That sounds funny now, but now when I think about it I didn't think it was funny at all. I think it was very serious and very noble to think that workers could control their own lives and to help to set up the necessary apparatus in the form of the Shop Committee movement which in time could become a source of real power so that the* [sic] *administered things on their own behalf and on behalf of people generally, or on behalf of all people like Aborigines and so on.* (GML 1996 v.V).

Personal issues facing strikers are often overlooked when the inconvenience of industrial action is faced by members of the public, such as public transport commuters. Mr. Alexander provides insight into the potential jeopardy that affected, and still affects many strikers:

…invariably at some stage or other in a worker's life, either once or more times, he's faced with a decision: shall I work or will I scab will I scab [sic] *or will I strike when you're a married worker with a family it's a big decision to go into a strike action not knowing how it might end. That sort of courage, on principle, is the thing that really typifies the working class of this country…the benefits such as might be now that Railway workers enjoy throughout the length and breadth of this country have been based on the early struggles of people like Ted Walsham and the Railway Shop Committee movement, to create a set of standards that the boss couldn't get over the top of…[?]* (GML v.V interview with Hal Alexander.

As noted in Volume II "Social and Oral History" of the Godden Mackay Logan report, 1996, time constraints precluded interviews with "marginalised workers" that is, Aborigines, women and migrants. One Aboriginal resident was interviewed, but no women or migrants. The recommendations of the Godden Mackay Logan report are that people representing these groups be contacted and interviewed as their experiences at Eveleigh are essential to the overall social interpretation of the site (Taksa 1996: ii). Nevertheless, some information regarding individual attitudes and perceived collective attitudes about the marginalised workers can be gathered from the existing interviews.

Based on the interviews of seven male former employees who are Anglo-Australian and one local resident who is Aboriginal, the perception was, and still is, that Eveleigh did not employ many Aborigines. Various reasons are given by the interviewees for this, including the notion that the jobs at Eveleigh did not suit the Aboriginal people in the local area. "*If they've been involved in the Railways, and a lot of them have been, to sort of work in country areas"* (interview with Brian Dunnet GML 1996 v. V). Most men can recall only "two or three" Aborigines who were employed at Eveleigh at one time. Allen Madden, the one interviewee who is Aboriginal, remembers the same proportion of Aboriginal employees. Mr Madden is a local resident and a member of the Metropolitan Local Aboriginal Land Council.

Figure 3.65: Metal working, possibly outside the wheel press shop with the southern facade of the Locomotive Workshops in the background. Source: ML Picman Citation no.: NCY40/285 Frame no.: Home and Away - 17152

The Railways employed a large number of skilled and unskilled migrant labour in the post WWII period of the major immigration phases. Comments were made about "deep seated resentment of all migrant workers because they were coming there to break down conditions" (interview with Hal Alexander GML 1996: v.V) that had been earned by the workers after years of struggle and strikes. The deep-seated resentment showed itself in more blatant ways as well – ""*What do we want to go on strike for him for, he's only a bloody wog". But, "You don't understand, comrade, you don't understand. He was sacked because he couldn't talk [he was a Greek fellow, Steve Stavros], couldn't speak the language properly and he couldn't explain why he'd had the day off*"" (interview with Hal Alexander GML 1996: v.V) – ultimately the communist ideals dominated because as Mr. Alexander says, a multicultural society is "*based on the working class resolving its problems and seeing the class factor as the unifying factor and racial origins, religion or something, is a secondary question"* (GML 1996: v.V).

The general perceptions of the migrant workers at Eveleigh however, are of initial problems that were sorted out promptly. Many people had left their own country for various reasons, either as refugees from oppressive regimes, or in order to make a better life for themselves and their families or even to make some money with the intention of taking it back to their homeland. John Willis recalls that the *"Baulks (sic)" (another euphemism for migrant) were "very good people, very, very good people those who came out in those days and they got on with the Aborigines like nobody's business*" (GML 1996: v.V). The term is sometimes written Baulks as here but more commonly as "Balts", from the Baltic states, or "Balks", from the Balkans. Another former worker recalls the first post 1950s migrant workforce:

We actually saw the first influx of the Italian and Greek people as migrants to Australia. They were very good really. In a very short time they became part and parcel of the workshop, got on very well. Most of them, after a couple of years, they were able to pass the likes of me. They seemed to be able to settle to saving and building businesses and all the rest of it while the average Aussie went to the trots or the pub. They put their back to the wall and they really did it. (interview with John Bruce GML 1996: v.V).

Figure 3.66: Cricket played between the rail lines, presumably at the Carriage Workshops or the Alexandria Goods Yard south of the Locomotive Workshops. Source: ML Picman Citation no.: NCY40/289 Frame no.: Home and Away - 17156

Mr. Bruce appears to have been struck by the "European style" of dress the migrants brought with them, in particular, the Italians who *in those days it was pointy shoes and tapered trousers – small cuffed trousers. So they stood out a little bit that way [but] they assimilated very well* (interview with John Bruce GML 1996: v.V).

Allen Madden comments that the *Maltese, Greeks and Italians and Kooris* who lived in the same area did so without incident and that *…it was just the white fellas that caused all the problems* (interview with Allen Madden GML 1996: v.V).

Another under represented group at Eveleigh is the women. The primary reason for what appears to be an androcentric characterisation of the workshops is that the workforce at the shops was made up *almost* entirely of men, particularly up until the 1970s when gender played a larger part in employment choices than it does now.

…[T]there was only a woman engineer who started. The place wasn't designed for women in there. I mean, urinals – they had urinals out there and there was one where you walked in … - I don't know how she ever got on. You walked into the large erecting shop and you walked straight in pass [sic] *the urinal. Well, I mean those were the old days. It wasn't designed [for women], the workshops* (interview with Keith Johnson GML 1996:v.V).

Some women were remembered for working in the canteen, as cleaners (interview with Hal Alexander GML 1996: v.V) or in administrative positions (John Bruce GML 1996: v.V) and in the munitions department during WWII. Women also worked in carriage cleaning and in trimming but this was not in the Locomotive Workshops.

First aid is another area that was occasionally occupied by women and where a series of nursing sisters were employed. The attitude apparent in the interviews is that the nursing sisters were somewhat authoritarian and difficult to deal with. One sister in particular, nicknamed "the Beast of Belsen", amongst other things, (Bill Leach & Bob Matthews GML 1996 v.V) was feared for her approach to minor injuries. Bill Leach describes her as *rather a big, fat lady. A horror to deal with. If she had splinters or anything in your fingers she got them out, no worries at all…you dreaded getting anything wrong with you so you didn't have to go and see her. She was particularly vicious on apprentices…that's right the 'Beat* [sic] *of Belsen', I'd forgotten about that, but she had a few other names too, I can tell you* (GML 1996 v.V).

The "Beast of Belsen" was Agnes Mary Lyons (Taksa 1999: 298-329), an ex-army sister and who, according to John Bruce was "not terribly popular because of her attitude and regimentation" (John Bruce GML 1996: v.V). Sister Lyons is remembered for her exemplary handling of a serious accident in the foundry that claimed two lives and injured many. With Sister Lyons "*you stood to attention…I'm given to understand that her work with those fellows was absolutely unbelievable. Her ability to cope was what was needed at the time and she sure did it [?]*" (John Bruce GML 1996: v.V).

The value of the interviewees' reflections of the "marginalised" employees lies in the move towards balance that they provide. On first impressions the "dirty" and heavy nature of the work precludes the employment of women on site – clearly this is not the case. The conventional Anglo-Australian view of history also presents a biased version of events that disregards the input of indigenous Australians and workers from non-English speaking backgrounds, which in turn hinders a fuller appreciation of the culture and politics that developed in and around the Eveleigh Railway Workshops.

Further interviews with Aboriginal workers, women and migrants are required to augment the social history of Eveleigh.

As a consequence of a micro-culture developing in the workshops, social hierarchies developed also. More established workers initiated apprentices into the job, just like they themselves had been when they first started. The "initiation rites" experienced by new recruits were not only a reminder of their status in the place but added some humour into an often serious and consuming job.

Ted Turner returned to Eveleigh at a recent "Back to Eveleigh" day. He wrote the following note (in capitals) recalling some of his experiences as an apprentice Fitter & Turner at Eveleigh. Mr. Turner's reminiscences describe a cultural order within the Workshops. Some of the activities that he describes were part of the employment conditions, but others were standard jokes older employees played on the new recruits:

BILL FITTER & TED TURNER WERE BOTH APPRENTICE FITTERS & TURNERS IN THE YEAR 1936. GREAT DIFFICULTY WAS OFTEN EXPERIENCED WITH WORKSHOP CORRESPONDENCE. IE. MR. FITTER OR MR. TURNER, APP. FITTER & TURNER.

I HAVE ALSO BEEN CAUSED TO TAKE THE WHEEL BARROW ALONG TO THE DAVEY [SIC] PRESS & I WAS TOLD TO COME BACK LATER AS IT WAS BEING USED, BUT IN THE MEANTIME IT WAS SUGGESTED I TAKE A LONG WEIGHT (WAIT) BACK TO THE ORGINASORS [SIC] OF SUCH STUNTS. IN THE MEANTIME THERE WAS I STANDING IN FRONT OF STORE DEPT. WAITING FOR A LONG WEIGHT (WAIT) CAUGHT BY THE MANAGER.ON THE MAIN DOOR OF THE ERECTING SHOP NORTHERN END (ON FACING WORKSHOP LEFT SIDE). THERE WAS A SIGN WHICH READ SOMETHING LIKE THIS:

-CIGARETTES-

NO EMPLOYEE IS TO ROLL HIS OWN CIGARETTES WHILST ON DUTY

(THIS WAS A TIME SAVER)

ALSO WHEN AN EMPLOYEE VISITED THE TOILET HE SUBMITTED A BRASS TOKEN ON ENTERING & WAS GIVEN 4 MINUTES GRACE IF OVER THIS TIME HE WOULD BE DOCKED 15 MINUTES PAY, YES AN ATTENDANT WAS PAID TO SUPERVISE SUCH ANTICS. AN ENVELOPE WAS PLACED ON MY MACHINE ADDRESSED AS SUCH PLEASE DELIVER BY HAND TO THE SUB FOREMAN MACHINE SHOP EVELEIGH SENDER ALL THE APPRENTICES CONTENTS WE BELIEVE YOU HAVE CHANGED YOUR NAME TO YOUR ANCESTRAL TYPE MR. LERGMON GOD

TRY THIS

TO READ

MONGREL DOG

WELDERS WOULD REPAIR CRACKED CAST IRON PARTS. DURING THIS PROCESS THE WELDER WOULD SOMETIMES HAVE TO WAIT LONG PERIODS FOR PARTS TO COOL SUFFICIENTLY PREVENTING CRACKING DUE TO SHRINKAGE.

THE WELDERS WOULD PLAY CARDS DURING THIS WAITING PERIOD THIS WAS OFFICIALLY ALLOWED, PARTICULARLY AT THE ERECTING WORKSHOPS CHULLORA, WHILST WELDING OF DIESEL ENGINE CYLINDERS.

GOOD LUCK I HOPE THIS INFO WILL HELP

TED TURNER

I HAVE LOST TRACK OF MY MATE BILL FITTER.

Ted Turner and Bill Fitter really were fitters & turners at the Eveleigh Workshops.

Other initiation rites are relayed in Volume V of the Godden Mackay Logan Oral History Transcripts (1996):

…Another one was the funnel trick. You were required to put a funnel in the top of your trousers, I'd say about a six inch funnel and it was supported in the belt at the front of your trousers. And you'd put a penny on your forehead like that [indicates] and you'd have to drop the penny into the funnel and while the penny was located on your forehead a fellow came along with a bucket of water and pours it down the front [laughs].

The Statement of Significance (Part 5) defines the value of the Eveleigh Locomotive Workshops on a number of levels including the high standard of construction, the development of the labour movements and the potential for research in railway workshop function to name only three. Another significant aspect of the workshops is that the place was used continuously as railway workshops for 100 years. Inherent in the duration of the workshops is the high standard of craft that was required to supply and or maintain most of the state's rolling stock. Interviews with employees, who worked in the shops until their closure, clearly communicate the level of pride that the men took in their work. "*Eveleigh is the last true great railway workshop. Although you see a few cracks here and there, it has been standing a hundred years, and I think that speaks very highly for the craftsmen and their skills. They created this place"* (former employee Dick Butcher in Moore 1996: 40).

The Eveleigh workshops in turn occupied a meaningful place in the lives of many of the workers and their families. Following is an excerpt of a letter in response to and ABC Radio interview and an article in the *Herald* newspaper. The letter is from Mr. John Sawkins and is dated 30 April, 1997.

My father worked at Eveleigh from approx. 1938 – 1947. He did his apprenticeship there, as an electrician, and often reminisced about the place, about some of the other men whom he 'served' with there – and I went there with him a couple of times when it was the site for Paddy's market. He was amazed that much of the wiring (on which he had worked) was still in place.

Figure 3.67: These two tickets were recovered from the floor in the Rope Annex. Source: Jean Rice 2002.

Figure 3.68: When construction was underway in 1996 a tarpulin was found hanging as a wall in the Rope Annex. On it were glued lottery tickets presumably bought by workers. The mural was removed and conserved for later display. This new entrance utilises the former opening to the rope annex. Source: Jean Rice 2002.

He had a number of friends from those times with whom he kept in touch. His name was Ron Sawkins – in died in 1991, so is not able to participate in your project, in which he would have been very interested, I'm sure. I'm gradually piecing together stories, which I recall, that he told me about life at Eveleigh. It was quite an institution, I think, and the Herald photo of the lottery tickets certainly spurred my memory a little – and also that of my mother. She's sure Dad would have been in some of the 'syndicates' at Eveleigh.

…The ABC Radio program mentioned the fact that Eveleigh had served as a site for assembling weapons during WWII, but that there were no records of the women who worked there.

As it happens, after my parents were married, they moved to a flat in Cremorne and two doors down were three sisters whom Dad had known at Eveleigh during the war…just what they did in the assembly plant at Eveleigh, I'm not sure. After the war they left Eveleigh, and Alison + Min continued with the railways – my memories of them are that they worked as ticket-collectors at Wynyard.

In more recent times, some individuals have initiated changes that have either affected working conditions or individual workers lives. Following are the stories of only two of these people.

LOUIS CAVALIERE

Louie Cavaliere is one of the last workers at Eveleigh and his story is significant for a number of reasons. As a migrant from Italy, Mr. Cavaliere fell into the category of "Balt", an indiscriminate term used for migrants before the term "New Australian" was coined (Hearn 1990: 146). Migrant labour made up a significant proportion of the workforce, with Aboriginal labour contributing to a lesser extent, and which in turn impacted on the residential demography.

Mr. Cavaliere emigrated to Australia from Italy in 1952 on an assisted package of £15 with the intention of finding work as quickly as possible. Within three months he had landed a job at the railways as an "office boy" and moved from Bonegilla near Albury to Redfern to begin work. In an interview Mr. Cavaliere describes his ascent into the labourer's hierarchy at Eveleigh:

Figure 3.69: Louis Cavaliere stands in front of a photographic exhibition by Monika Allan at a "Back to Eveleigh" day. Photo: Jean Rice c.1998.

I started as an office boy then went in as a shop boy. A shop boy used to sweep the floor, pick up the lunches for the men. I went as a workshop labourer, then …I went to a fitter assistant then a third-class machinist then to a second-class, then to acting first-class, then as a crane driver because an overhead crane driver clears more money than anyone else in the workshops (Hearn 1990: 146).

During the 1950s one of the Australian Railway Union's (ARU) objectives was to target migrant workers to join the union and theoretically the non-English speaking recruits should have benefited the most because of the language barrier. Even so, the work environment at Eveleigh was not conducive to the enhancement of language skills. The non-English speaking migrants continued to communicate with each other in their own language and only picked up enough English to do their job. There was neither the time nor the services available for an unskilled labourer to attend English language classes. Needless to say, many of these workers started at a lower-skilled level and remained there because they did not possess enough English to be trained for a job of a more complex nature. Mr. Cavaliere pushed for English language classes and in 1969 the first half-hour class was held. Management suggested Mr. Cavaliere teach the classes, a suggestion he resisted, and soon the migrant workers were being taught English by a small group of management clerks (Hearn 1990: 147).

In 1981 Mr. Cavaliere's role in the ARU shifted towards managing the union's responses to cost cutting measures being implemented by the State Rail Authority (SRA). In October of 1982, David Hill the SRA Chief Executive declared that in order to save money the workshops had to be downsized or workers would be sacked. The function of the workshops went into decline from then until their closure in 1988. In 1999, Mr. Cavaliere received a Scroll of Honour from the Rail Bus and Tram Union for his "outstanding contribution to the trade union movement" (Unions NSW 1999: Scrolls of Honour).

MONIKA ALLAN

Monika Allan was the last "English in the Workplace" teacher for the Adult Migrant Education Service (AMES) at Eveleigh Carriage Workshops in Wilson Street. Ms. Allan taught there from September 1983 until the classes were cancelled in December 1985. In addition to teaching, Ms. Allen used the workshop and employees as subjects for a photographic assignment, which was later exhibited at the "Back to Eveleigh Day" in 1997.

The classes began in a louse-infected Union Shed a "dingy, cramped and dirty shack just across from the Bogie Shops" (Allan pers. comm.) and consisted of four, 2-hour classes a week – an Intermediate class for those more advanced in English and an Elementary class.

One of the most apparent effects of the language barrier was that many of the men and some of the foremen remained in the same job, long-term, with little hope of professional advancement. Some of the men had emigrated 20 years previously but for various reasons failed to learn the language of their adopted home. Indeed, it is likely that many of these men attained a low level of education in their birth country which made it all the more difficult to learn a new language and cultural idiom while working, particularly when surrounded by colleagues of the same or similar cultural background. Although many of the men struggled with the lessons, according to Ms. Allan, the desire to learn was there and much of the learning was completed as "homework".

The first two terms of AMES in 1985 were held in the modern conference room under the Administration block. The promotion in resources was short-lived however, and the classes were moved back to the Union Shed after being contracted into one. All the levels were amalgamated, which made teaching and learning even more difficult, but as the carriage works were being wound down, so the number of staff decreased. The last move back to the Union Shed heralded the demise of the AMES project and sixteen years after they began, English language classes at Eveleigh ended.

Monika Allan was born in Denmark and raised in Australia from the age of five. Formerly an ESL high school teacher and school counsellor, her move to Eveleigh enabled her to document daily work-related activities. She had the advantage of being such a familiar sight around the Bogie Shops when liaising with foremen and migrant men for assessment and recruitment, that Ms. Allan was able to photograph freely with very little self-consciousness on the part of the subjects.

3.10 COMPARATIVE ANALYSIS

3.10.1 Background to Industrial and Railway Buildings

Although iron was used in the construction of buildings in the Greek and Roman Empires, it was not in large-scale structural use until the Industrial Revolution. During the nineteenth century, engineers developed a good understanding of the material and designed structures in which the use of exposed iron was acceptable.

The industrial era and the technology of iron came to many countries with the building of railways and structures associated with railways. Throughout the world railway workshops are often amongst the first and largest heavy engineering developments in a country. Initially, buildings of the Industrial Revolution were constructed of load bearing brickwork. At the beginning of the nineteenth century, however, the coming of the "iron age" and the need for free floor space combined to make the use of cast iron pillars for internal supports more common. External walls were still commonly of masonry and roof lighting was used. The use of large span roofs, first in wood and then in iron, developed from railway requirements. Banister Fletcher attributes the technical advances in the use of iron to the early railway engineers and mentions amongst others Robert Stephenson and Islamabard Kingdom Brunel, both of whom were known to Whitton and Cowdery *(Refer Section 3.8 Associations)*.

It was common practice for engineers who designed locomotive and rolling stock to be involved in the design of roads, locomotive shelters, passenger halls and repair shops (Steiner 1984: 39). This led to the transfer of technology from engineered railway structures to buildings, particularly as these new types of buildings had no precedents.

Figure 3.70: Manchester Central, England 1876. Train shed designed by Sir John Fowler. This type was represented in Australia by the now demolished running sheds (see fig. 3.22). Source: Binney *et at*, 1979: 46.

Figure 3.71: Interior of St Pancras Station, London, a spacious hall made possible by the use of new iron technology. Source: Kate Mountstephens (DPWS), 1998.

IRON AND STEEL

Early use of iron in building was predominantly of cast iron. The use of wrought iron in building developed when new processes were discovered for producing it economically. Cast and wrought iron are different materials with cast iron composed of about 3.0 - 5.0% carbon (and is more resistant to rust) and wrought iron composed of about 0.02 - 1.0% carbon. The removal of carbon gives wrought iron its strength in tension and makes it easier to shape. In comparison cast iron has high compressive strength but is brittle. Wrought iron's malleability enabled it to be rolled into plates and rods and later other shapes that could be riveted. From 1830 to 1850 many efforts were made to combine cast and wrought iron to exploit the characteristics of both materials.

Processes for the manufacture of steel were not developed until the late 19th century and steel was not generally available until the 1890s. In Australia steel was not produced until 1915. Produced by heating iron to high temperatures and adding carbon (up to 2%) in a controlled process, steel supplanted wrought iron because it could be cast, rolled or forged and welded and was more economically made in a mass production process (Elliot 1992: 79).

 In this section the original Bay numbers are used, 1-4, 4a and 5-15

The great era for iron construction was the mid-Victorian period in which structures such as the Paddington Station building (1852-54) by Brunel and Wyatt and the huge single arc of St. Pancras Station (1867) designed by Barlow, both located in London.

Early sheds were roundhouses with a turntable in the centre, but these soon became redundant and where replaced by long bays. As the design of sheds was often the responsibility of the Chief Mechanical Engineer, various railway companies developed their own standardised design, which was then repeated. The development of these buildings paralleled railway expansion and the industrial era, with its accompanying iron and steel technology, came to many countries with the railways. In many countries, railway workshops were amongst the first and largest heavy engineering developments.

The development of the stationary steam engine and the rope driven crane, along with iron construction technology, led to the development of an international construction idiom for heavy industrial workshops. The use of gantry cranes required long bays with double columns used to support crane rails and single columns above to support the roof. Iron columns increased floor space while iron trusses allowed wide bays, which could be created side by side. Top lighting was used to illuminate the large workshops. The bay layout also suited the division of the space into units that reflected works divisions. The English models, essentially generated by needs and contemporary technology, were repeated and developed throughout England and in other countries. Australia followed British precedents which are illustrated by the small two-bay wide sheds in the Redfern Railway Yards (refer Section 3.4) and the bigger, ten-bay version at Eveleigh Carriage and Wagon Workshops

The long bay format was common in railway workshops but also in a range of other workshops, for example those for the manufacture of ships and large engines. Later developments of the idiom (from 1900 to 1910 in Australia) saw the use of riveted steel plate members replacing cast iron. These were eventually supplanted, for smaller members at least, by rolled steel sections. At around the same time, power sources were changed from steam to electricity.

Railway station halls developed differently from railway workshops. As the railways prospered and expanded, stations had to be enlarged to meet the growing crowds. Halls therefore spread horizontally to cover more and more tracks and the engineers attempted to design systems with as few columns and as wide spans as possible. Their designs took on a unique spaciousness which had not been known since Roman times, and a lightness through the use of iron which had never before been structurally possible.

Binney and Pearce (1979) estimated there were in excess of 4,000 'engine sheds' built in Great Britain in the 19th and 20th centuries. The use of the term 'engine sheds' overlaps with the term 'workshop'. The term 'sheds' refers specifically to sheds where engines were maintained but was also used generally to apply to entire railway workshop complexes.

Conventional stylistic features were used in nineteenth century engineering structures and their development paralleled the development of stylistic features in architecture generally. Thus, as architects applied and adapted classical or other themes, so did engineers. Industrial buildings were designed to conform to nineteenth century taste and thus often retained masonry external walls.

Another structural type that utilised the possibilities of iron was the greenhouse, which required large span, open buildings. This type developed in England and in Europe in the 1830 and 1840s. The use of cast iron was preferred for these structures as it was easily produced in curved pieces so curved glass surfaces could be created.

Exhibition buildings and exposition halls were another type where the use of iron suited the needs and was aesthetically acceptable - particularly when the products displayed included machinery. Market buildings of various sorts also exploited the structural advantages of iron. London's Convent Garden Fruit Market of 1826 is one of many examples in the UK as well as other examples in France. In the late 1800s, iron was also applied to department stores such as the 1870s Bon Marché in Paris.

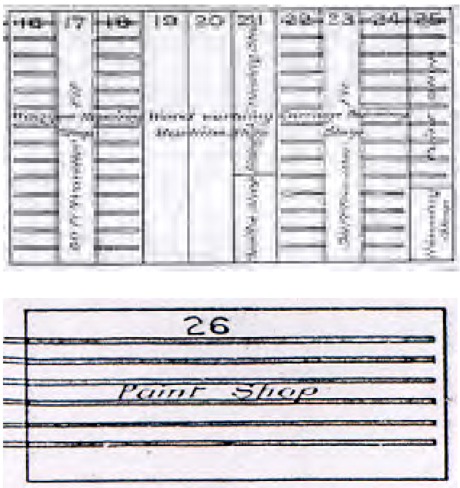


Figure 3.72: The Eveleigh Locomotive Workshops and the Carriage and Wagon Workshops building, top, have transverse rails which run across the structural bays while the Paint Shop, bottom, has longitudinally arranged rails and pits which run parallel to the structural bays. Source: SRAO Drawing EW7

In this section the original Bay numbers are used, 1-4, 4a and 5-15

In Australia, surviving examples of these types of buildings include, railway workshops such as Eveleigh, railway halls such as Sydney Terminal (Central Station) and the Palm House greenhouse in the Adelaide Botanic Gardens, (http://www.environment.sa.gov.au/botanicgardens), which was imported from Germany in 1877. Large exhibition buildings in Australia, such as the Garden Palace in Sydney and the Melbourne Exhibition Building, were constructed of timber, and iron examples are not known. However, iron market buildings were built and examples were the now demolished Darling Harbour Meat Market and the George Street Markets (now the site of the Queen Victoria Building) in Sydney.

Figure 3.73: George Street Markets, 1870, was an example of another type of iron building in Australia. It was replaced by the QVB, Sharkey Collection 776, PWD.

Figure 3.74: Meat Markets, Darling Harbour. Interior view. The photograph shows round cast iron columns, wrought iron trusses and iron roofs, Sharkey Collection, PWD.

Examples in other states are not known but may exist. By the time department stores came to be built in Australia the 'Iron Age' was ending and they tended to be built of steel and/or concrete. The Mark Foy's building in Sydney was modelled on Bon Marché, Paris, but used an innovative concrete structure. The Dowling Street Tram Depot of 1908 was a late cast iron columned structure designed by George Cowdery's son but this has been demolished. The Macleay Museum at Sydney University utilises cast iron structurally and as box gutters all within Gothic Revival style stone walls.

In the period 1900-1910 the structural use of cast and wrought iron was overtaken by the use of riveted steel construction and then by rolled steel construction. Subsequently, cast and wrought iron were mostly used for decorative elements such as balustrading, gates and ventilators.

3.10.2 Background to National and International Comparisons

Throughout the late nineteenth and early twentieth centuries steam railways developed throughout the world. No definitive worldwide study has been done and the comments that follow are based on published sources, on the personal experiences of the authors of this report, internet searches and email communications with individuals from historical societies.

The railways in Australia are based strongly on the English precedents both because of Australia's origins as a British colony and the leading role taken by Britain in the development of the industry. New South Wales' original rolling stock and rails were all imported from England and it was not until much later that American vehicles started to be imported or used as models.

One of the unusual features of the Australian Railways is that from soon after their construction they were government owned and run and all the major developments were initiated by the government. In Britain and in the United States, the early railways were run by a multitude of small private companies. In Britain, the railways only became government owned in 1948.

The early engineers and managers on the New South Wales railways were trained, and gained their initial experience, in the British system. It was often not until this century that senior positions came to be held by Australian born and trained staff. The leading early role played by the British railways also led to strong influences over the development of railways in the rest of the world, especially in other British colonies. The influence of the British railways on Australian systems can be seen in the use of English names for Workshops such as Newport (in Melbourne) and Midland (in Perth). In Sydney, the suburb of Darlington, adjacent to the Eveleigh Railyards, was named after the destination of the first British railway.

This analysis concentrates on British comparisons because of the importance of their influence but also because of the limited information, which could be gained from railway workshops elsewhere in the world. Though there is considerable information on railway lines, trains and grand railway buildings there is little published material on railway workshops.

The first railways ran with wooden wheels and track in the sixteenth century in mines in Central Europe. Power for these early systems would have been provided by people or horses. Mining railways were introduced into England from Germany.

Iron rails first appeared at Coalbrookdale, England in 1767 but it was not until the 19th century that the great railway systems developed.

Figure 3.75: Northern elevation of the Eveleigh Locomotive Workshops on the left and Carriage Workshops on the right, 1998. The buildings are typical of Victorian industrial buildings and demonstrate masonry exteriors designed to conform to nineteenth century taste. Photos: Jean Rice

 In this section the original Bay numbers are used, 1-4, 4a and 5-15

The dates of opening of some steam railways around the world established are listed below.

1825 Stockton to Darlington, England

1830 Liverpool to Manchester, England

1831 South Carolina Railroad, USA

1834 Dublin to Kingstown, Ireland

1835 Brussels to Malines, Belgian (Government run as part of a national system, the first in the world to be designed as such) 1835 The Ludwigsbahn, Nuremburg to Furth, Germany,

1836 Champlain and St Lawrence Railroad, Canada Quebec to St. John

1837 St. Petersburg to Tsarskoye Selo & Pavlovsk, Russia

1838 Vienna to Florisdorf, Austria

1839 Amsterdam to Haarlem, Netherlands

1839 Naples to Portici, Italy

1844 Basle to St Louis, Switzerland

1844 St Etienne to Andrezieux, France

1846 Pest to Vacz, Hungary

1847 Copenhagen-Roskilde Railway, Denmark, (Altona-Kiel opened 1844, annexed by Prussia)

1848 Barcelona to Mataro, Spain

1851 Chile, the first in South America

1853 Bombay to Thana, India

1854 Brazil

1854 Oslo to Eidsvoll, Norway

1854 Flinders Street to Port Melbourne, Victoria, Australia

1855 Sydney to Parramatta, NSW, Australia

1856 Gothenburg to Jonsered, Sweden

1857 Parque to Floresta, Argentina

1857 First steel rail (previously iron)

1859 First Pullman sleeping car in USA.

1860 Durban to the Point, South Africa

1863 First underground, London, England

1863 Christchurch to Ferrymead, New Zealand

1869 Bucharest to Giurgiu, Romania

1872 Yokohama-Shinagawa, Japan

1874 Pullman cars introduced to England

1876 Shanghai to Woosung, China

1881 First public electric railway in the world, in Berlin

1884 Belgrade to Nish, Serbia

1931 Turkestan to Siberia, Russia

1948 Nationalisation of the British Railways

Most of the world's major railway systems were established in the mid nineteenth century. Countries with similar size rail networks to Australia, in terms of length of rail line, include Argentina, Brazil, China, France, Germany, Great Britain, Japan, Mexico, Poland, and South Africa. The Indian and Canadian networks are twice the size of Australia's, while the former USSR has a network four times the size of Australia's, and the United States a network ten times its size and the largest in the world by far.

There are steam railways currently operating in India, China and South America which must have operating workshops. Little is known about these nor those in Eastern European countries or Russia which also must have had similar facilities. The erecting shop of a locomotive works at Moghulpura, Pakistan uses riveted plate construction, a later form of construction than the buildings at Eveleigh (Nock 1977).

Figure 3.76: The erecting shop of the Locomotive Works at Moghulpura. This photograph was taken before Independence when the works belonged to the North Western Railway. They became part of the Pakistan Western Railway on formation of Pakistan. Source: Nock 1977: 78.

 In this section the original Bay numbers are used, 1-4, 4a and 5-15

3.10.3 North American and European Railway Workshops

The following notes are taken from the 1914 - 1915 New South Wales Public Works Department Annual Report: “Report on Locomotive Manufactories and Locomotive Repairing Establishments” by A.D.J. Forster. Forster’s report is based on an extensive visit to railway workshops and concentrates on locomotive workshops, although it also includes plans of many other workshops around the world. The existence and operational status of all the sites has not been ascertained for this CMP, however recent information on some of the workshops has been gathered. This analysis refers to both the Locomotive and Carriage Workshops, in particular, where they are located together as at Eveleigh.

Comments are made on the layout of works including whether rails are transverse or longitudinal. At the Eveleigh Railyards, the Large Erecting Shed and the Paint Shop have longitudinal rails and the Carriage Workshops has predominantly transverse rails. The Locomotive Workshops has all transverse rails except for the central road.

This comparison summarises Forster’s report so the focus is historical with only some recent information about these works. Forsters’ comments were particularly directed as to whether repair works should be concentrated at one large site and whether rail layouts are transverse or longitudinal. Presumably these were important issues in the NSW system in 1914/15 in view of the development of the Chullora and Elcar sites in the early 1920s. The American works were all 20th century and the buildings quite different in cross section with much flatter roofs.

North American Workshops

The following notes on American Locomotive Workshops are taken from the Forster report. Their form and layout are compared to the Eveleigh Railyards. It is not known how many of the following workshops are still in operation or existence although recent comments of experts in the United States suggest that they are not.

As a preface to his comments on the American railway works, Forster explains that his selection of works has been based on those which were *comparatively new, and have been carefully designed to take care of the repairs arising from a definite number of ... locomotives, and to provide for a definite limited extension. The case is quite different with British repairing works, most of which have been reorganised from time to time to the detriment of the overall efficiency of the works*.

Battle Creek Locomotive Works, Michigan 1909

These works comprised a main building which housed both the erecting and machine shops as well as several other buildings, all of which were served by a shared crane. The erecting shop had transverse pits but, instead of a using a traverser as at Eveleigh Carriage Works, locomotives were transported to the appropriate track by an overhead crane.

Beech Grove Car and Locomotive Works, Indiana, 'Big Four' System 1909/-

In this example, the individual shops had transverse pits and an external traverser was fitted between the coach and paint shops to serve them both (similar to Traverser No. 1 at Eveleigh). A rail line and an external overhead travelling crane link the shops and traverser. The structure was of steel and had slate roofs. Forster described Beech Grove as a "splendid example".

Billerica Locomotive and Car Shops, Massachusetts, Boston and Maine Railroad 1914

These works occupied 100 acres. They were described as 'particularly well laid out' and included an 80 foot traverser between the carriage and paint shops and a built in scaffolding system in the paint shop (similar system also in Springfield). There are fans of rails adjacent to both the carriage and paint shops. In the locomotive area the provision of scrap bins and of an overhead travelling crane controlled from the ground was noted.

Locomotive Works for the Chicago, Rock Island and Pacific Railway, East Moline, Illinois, 1903

This site covered 700 acres and maintained 800 locomotives. The pits were laid out neither longitudinally nor transversely but in a herringbone arrangement. Locomotives were conveyed within the shop by overhead cranes rather than by a traverser.

Locomotive, Car and Wagon (Repair) Shops for the Lake Shore and Michigan Southern Rail, Collingwood, Ohio, 1902

The car paint shop, car repairs and freight car repair shops were built parallel to each other and had transverser rails. They were served by 'transfer tables' (traversers) laid out between them. These transfer tables were linked to lines in the coach yard, at one end of which was a fan of rails.

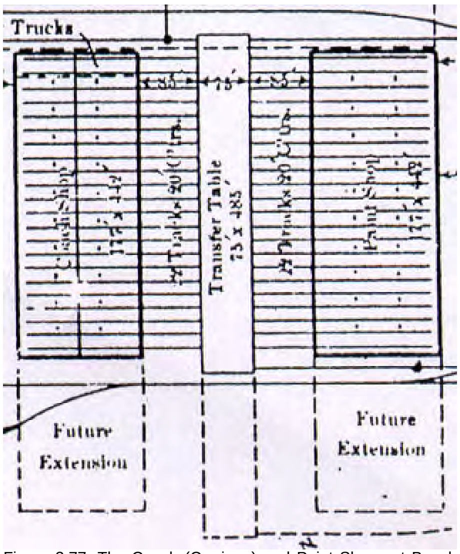


Figure 3.77: The Coach (Carriage) and Paint Shops at Beech Grove were connected and served by an external traverser. Source: 'Report on Locomotive Manufactories and Locomotive Repairing Establishments' Fig 24a.

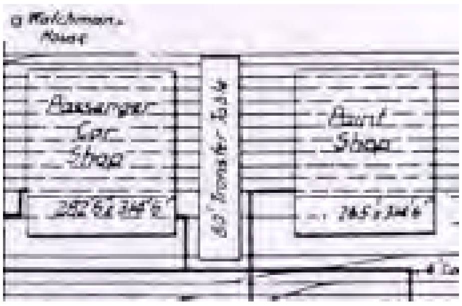


Figure 3.78: Detail of plan of the passenger car shop and paint shop at Billerica. Note the external traverser, similar to Eveleigh. Source: 'Report on Locomotive Manufactories and Locomotive Repairing Establishments' Fig. 37.

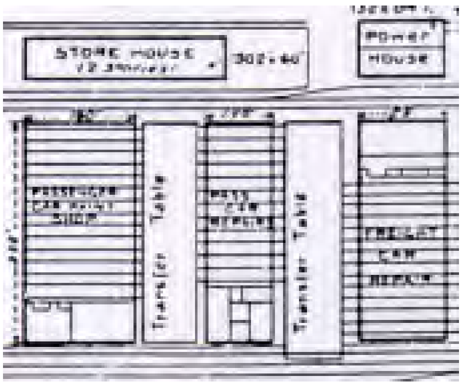


Figure 3.79: Diagram Plan of the Passenger and Freight Car (Carriage and Wagon) shops at Collingwood. External traversers serve the workshops in an arrangement similar to that at Eveleigh Railyards. Source: 'Report on Locomotive Manufactories and Locomotive Repairing Establishments' Fig. 31.

In this section the original Bay numbers are used, 1-4, 4a and 5-15

Locomotive, Carriage and Wagon Shops, Louisville & Nashville Railway, Tennessee, 1905/06

The site was adjacent to the main line and the workshops were laid out on either side of an external 'transfer table' (traverser). As at Beech Grove, the works had a common store yard with an overhead crane.

Locomotive Works, Reading, Philadelphia, Pennsylvania, 1902

These works had transverse erecting pits. Their construction allowed the closure of various older, smaller works.

Locomotive Repair Shops, Sayre, Philadelphia, Pennsylvania, 1904

Forster commented that these were 'one of the best and largest locomotive repair shops in the United States of America'. The works occupied about 100 acres and had a similar layout in the carriage and wagon area to Collingwood and Billerica. Again, the pits were arranged transversely. The elevations provided in the report suggest that the exteriors of these shops were masonry and the interior structures of steel.

Figure 3.80: Elevation of the Main Locomotive Shop, Lehigh Valley Railroad, Sayre, Pa. Source: 'Report on Locomotive Manufactories and Locomotive Repairing Establishments' Fig. 34

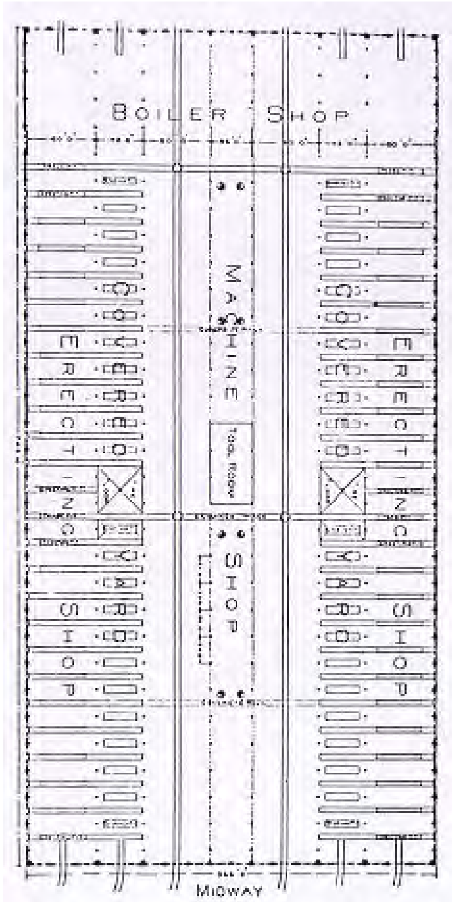


Figure 3.81: Plan of Main Locomotive Shop, Sayre, Pa. Note the transverse pits similar to theose at Eveleigh. Source : 'Report on Locomotive Manufactories and Locomotive Repairing Establishments' Fig. 33.

Locomotive and Car Shops, Winnipeg, Manitoba, Canada, 1910

These works are laid out on either side of an external overhead travelling crane runway, which also has a rail line along the centre. At the other ends of the buildings, which are perpendicular to the runway, are fans of rail lines, which presumably link to the main lines. The rails are arranged longitudinally within the shops. From the drawing provided in Forster's report, it appears that the shops themselves are similar to Eveleigh Carriage Works in that they have masonry exteriors and steel structure.

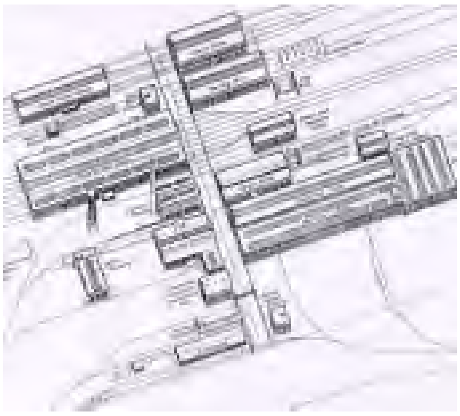


Figure 3.82: View of the Winnipeg Works. The Coach (Carriage) Shop and Paint Shop are at the top of the drawing. Their rails are arranged longitudinally. Source: 'Report on Locomotive Manufactories and Locomotive Repairing Establishments' Fig. 35.

The Montreal Locomotive Co.
Forster commented that the arrangement of the works follows American practice very closely. The shops were arranged in bays which were served by overhead cranes, rather than traversers and rails were arranged longitudinally.

In addition to these North American examples, a 1906 photograph shows the turntable and sheds at Salida on the narrow gauge Denver and Rio Grande railroad in 1906. With their masonry walls, repeating gables and hinged timber doors, these sheds share some of the characteristics of the Eveleigh Carriage Workshop and Paint Shop but are much smaller.

A 1911 photograph of the running sheds and workshops at Paraiso, taken about 1911, shows the timber sheds used by the Panama Canal Railroad (Fig. 3.83). Although these sheds appear to have been of timber structure with iron cladding, the repetitive gable form is similar to the Eveleigh Locomotive and Carriage Workshops buildings.

Figure 3.83: The Running Sheds and Workshops at Paraiso on the Panama Canal Railroad, c.1911. Source: Nock 1975: 151.

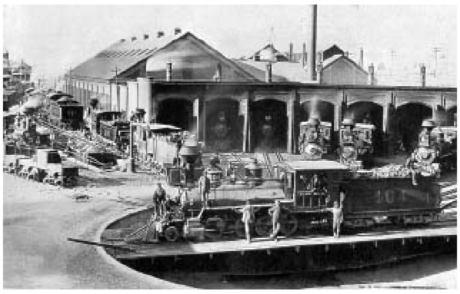


Figure 3.84: Turntable and Workshops at Salida on the Denver and Rio Grande Railroad, 1906. Source: Nock 1975: 101

European Workshops

Again, these notes are taken from Forster's 'Report on Locomotive Manufactories and Locomotive Repairing Establishments'.

Borsig's Locomotive (Construction) Works, Berlin (Tegel)
The third largest continental locomotive factory at the time. Each department was in an entirely different shop, an arrangement which 'could not be commended' as it led to sidings being congested. The erecting shop had central internal traversers with transverse pits.

Kassel, Locomotive and Vehicle Construction
From steel making to fabrication, the largest and best-organised works in Europe. A section of the building shows flat trusses, steel construction and brick external walls.

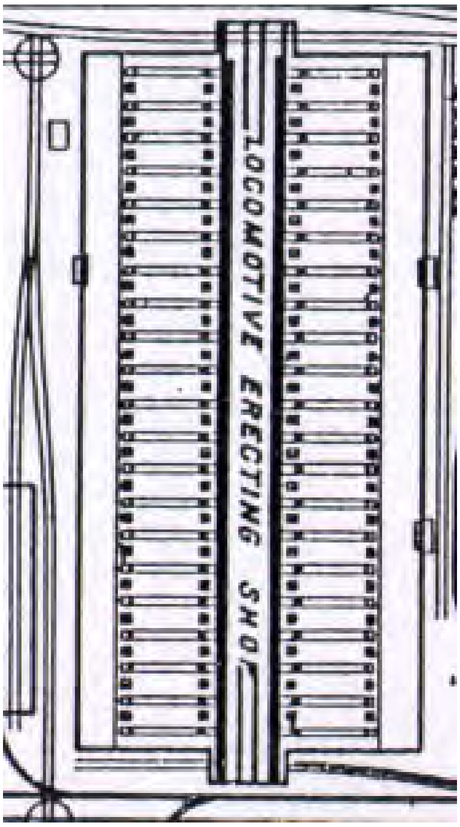


Figure 3.85: Detail of plan of the Locomotive Erecting Shop at Tegel, Berlin, in about 1914. Note the transversely arranged pits and the central traverser, similar to Eveleigh Carriage Workshops. Source: 'Report on Locomotive Manufactories and Locomotive Repairing Establishments' Fig 12.

 In this section the original Bay numbers are used, 1-4, 4a and 5-15

Comparison

The American works cited tended to use more transverse than longitudinal pits, particularly in association with the use of external overhead travelling crane runways. This may be related to the later dates of these works when compared to the British examples, to advances in technology or this may be a particular feature of American systems. There is insufficient information to draw conclusions about the European works.

In their report on the Newport Railway Workshops, Carl and Margaret Doring note that "The Curator of Mechanical Engineering at the Smithsonian Institute and the Director of the Historic American Buildings Survey/Historic American Engineering Record could think of only two remotely comparable workshops [to Newport and Eveleigh] in the United States. One is a much smaller but fairly intact workshops for a small private narrow-gauge railroad. The other is a large workshops which had been stripped of all machinery, and which [was then] being restored and re-equipped at great expense for museum purposes" (Doring *et al,* 1988:3).

3.10.4 British Railway Workshops

The first ever steam train to run on a public railway ran in England in 1825 and by 1923 there were 120 independent railway companies in Britain.

The technology of railways and the engines, carriages and rails themselves were exported all over the world, particularly to the British Empire. British railway engineers also worked all over the world designing railway systems.

In 1923 the 120 companies were amalgamated into four, the Great Western Railway, the London, Midland and Scottish Railway, the London and North Eastern Railway and the Southern Railway. In 1948, these companies were nationalised and organised into the six regions (and subsequently five) which comprised British Rail. In 1986, manufacture and maintenance were rationalised. This process resulted in British Rail retaining control over maintenance depots because of their close connection with the railway while heavy repair and new manufacture began to be contracted out.

British Rail retained works at Glasgow, Doncaster and Wolverton, all on a reduced scale, and Eastleigh. Other main works have been sold or closed. Some works are being operated by private owners (refer below) but England no longer has the heavy engineering capacity it formerly did, demonstrated by the necessity to send large wheels to India to be turned.

The following notes provide a brief description of the major British railway workshops and relates them to Eveleigh as for the American and European workshops above. The bulk of the information has been taken from Edgar Larkin's "An Illustrated History of British Railways' Workshops" and from A.D.J Forster's "Report on Locomotive Manufactories and Locomotive Repairing Establishments" appended to the NSW Public Works Department Annual Report in 1914/15. The most recent information has been obtained via email or from historical society and interest groups on the World Wide Web.

 In this section the original Bay numbers are used, 1-4, 4a and 5-15

British Workshops

Ashford Locomotive and Wagon Works, England, 1847 - 1850

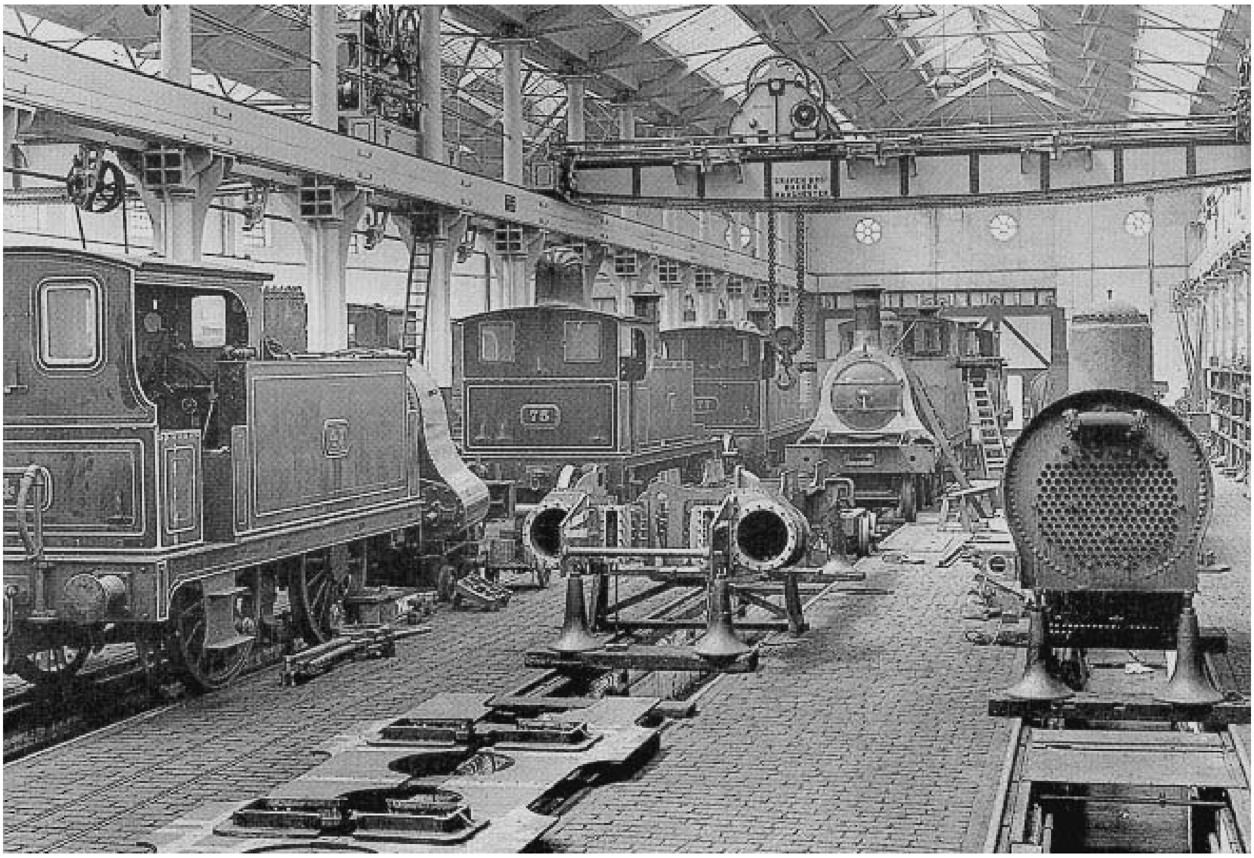
The complex included the Locomotive Works of 26.5 acres and the Wagon Works of 32 acres. The Loco Works included a longitudinal internal traverser with transverse rails in the erecting shop and like Eveleigh, the building contained internal brick arched walls. The Wagon Works was similar to the Locomotive Works in design and also had an external traverser. Construction and repair of freight vehicles were undertaken at the Carriage Works. In 1962 the Wagon Works was amalgamated into the Locomotive Works. Both parts of the works were closed by 1982 except for some crane repair, which was still being carried out at the Locomotive Works in 1992.

Bow Locomotive and Wagon Works, England, 1853

This was the smallest of the main works in Britain with a site of 10 acres. Each bay of the Erecting Shop contained three rails which ran longitudinally. The Erecting Shop also contained a Craven Bros. crane similar to those at the Eveleigh Carriage Works.

The site was closed in 1960 and its workload transferred to Derby. A wagon shop had been included in the complex but it had been demolished by 1992.

Figure 3.86: Interior of the Erecting Shop at Bow Locomotive Works in 1898. The ‘Craven’ crane is similar to those in the Eveleigh Locomotive Workshops. In railway workshops, bay width, and therefore roof span, was limited by the need to support the crane. Source: Larkin 1992: 31.



Brighton Locomotive Works, England, 1840
This 9 acre site was located adjacent to the main railway station in Brighton. During the Second World War, the Works produced component parts for tanks and anti-aircraft defence as well as freight locomotives for the war office.

A fan of rails led into the boiler and erecting shops which both contained longitudinal rails and exits at the opposite end. The Works was closed in 1964.

Caerphilly Locomotive, Carriage and Wagon Works, Wales, 1899 -1901.
The 9 acre Locomotive Works was built to undertake locomotive repair, rather than construction, work. The Carriage and Wagon Works were constructed on a site of 6.5 acres and repairs, new construction work and conversions to carriages and wagons were carried out there. In 1930, wagon work was transferred to other sites. Conversion work ceased soon afterwards and this was followed by the gradual phasing out of carriage and wagon work. From 1939, only carriage repair work was undertaken at Caerphilly. A new carriage repair shop was later constructed but wagon work was no longer undertaken.

The carriage workshops were closed in 1962 and their workload was transferred to Swindon with the exception of some diesel railcar work. The Locomotive Works was closed in 1963 and converted into an industrial estate. A fan of rails led into the carriage shops which contain rails arranged longitudinally. The erecting shop had an internal traverser and transverse rails. The Carriage Workshops have been demolished due to structural instability. (http://members.tripod.com/~BDaugherty/railways/glamorgan.html#Caerffili).

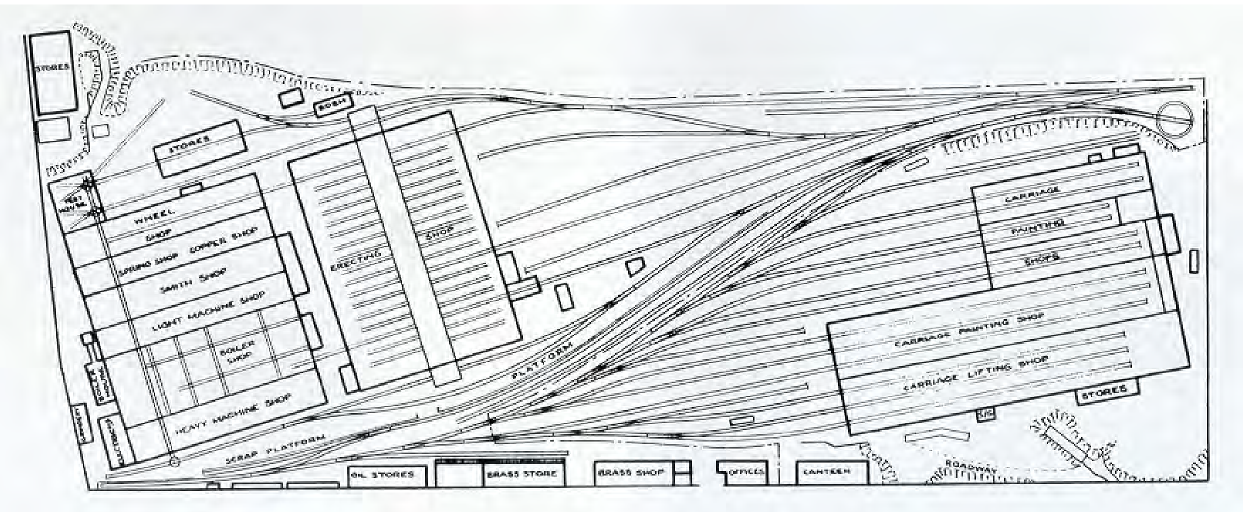


Figure 3.87: Caerphilly Locomotive, Carriage and Wagon Works. The erecting shop had an internal traverser with pits on either side while the machine and smiths shops had minimal internal rails. A fan of rails led into the Carriage Shops in which the rails were arranged longitudinally. Source: Larkin 1992: 36

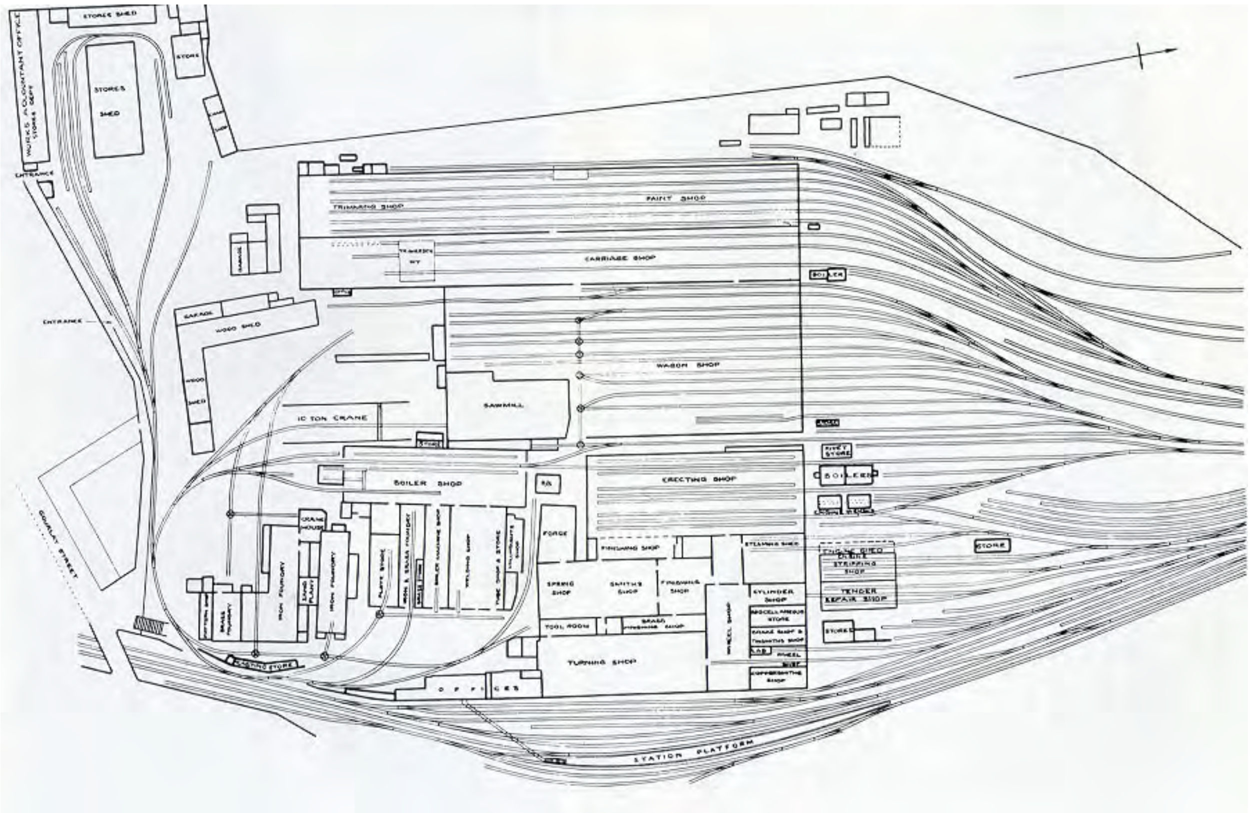


Figure 3.88: Cowlairs Works. The Locomotive Workshops are at the bottom of the plan and the Paint Shop/Trimming Shed, Carriage Shop and Wagon Shop are at the top. They all have longitudinally arranged rails. Source: Larkin 1992: 38.

Cowlairs Locomotive, Carriage and Wagon Works, Scotland, 1841-1843.

This locomotive and carriage works was located on a 167 acre site. The Wagon Works undertook both heavy and light repairs to wagons but was not involved in new construction. The Locomotive Works was involved in constructing sections for gliders during the Second World War.

Large fans of rails next to the main line led into each of the paint, trimming, car and wagon shops. The shops contained longitudinal rails with dead ends and there was an internal traverser in the carriage shop only. Railway industry was transferred to St Rollox Works in 1968 and the site is now an industrial estate (http://www.railscot.co.uk/Edinburgh_and_Glasgow_Railway/body.htm).

Crewe Locomotive Works, Wales, 1843.

This 137 acre locomotive works was still operating and manufacturing electric locomotives in 1992. During the Second World War, Crewe manufactured tanks and parts for heavy guns. A fan of rails leads to the locomotive paint shop which contains longitudinal rails with dead ends. Various other shops contain internal traversers. Similarly to Eveleigh, the external walls are brick and have windows with arched heads. Internally, the bays are divided by iron columns. Typically, the bays have three sets of longitudinal rails. Parts of the works are still in use.

Figure 3.89: The Paint Shop at Crewe Works - a very similar arrangement to that at Eveleigh Running Shed and Paint Shop. Source: Larkin 1992: 47.

Darlington Locomotive Works, England, 1863.
These works covered a site of 27 acres. The Paint Shop has an external traverser and fan of rails leading to longitudinal internal rails. The Erecting Shop had transverse rails in each bay. 18 pounder shrapnel shells were manufactured at Darlington during WWII. In his 1915 report, Forster considered this the best British example of the transverse pit arrangement. The site was closed in 1966 and the workshops are now used by the Darlington Railway Preservation Society for locomotive restoration work (http://www.drcm.org.uk/Frames/MDdrps.htm).

Derby Locomotive Works, England, 1840
The site eventually covered an area of 47 acres adjacent to the station. There is a fan of rails to the Diesel Engine Shop and Paint Shop, which contain longitudinal rails. The complex has a range of building styles and arrangements.

Derby Litchurch Lane Carriage and Wagon Works, England, 1876
These works were and extension of the Derby Locomotive Works and were built on a site of 128 acres. The workshops look physically similar to Eveleigh and include brick gable ends, lattice girders and round columns. No plan has been found. Photographs show both transverse and longitudinal rail layouts, an external traverser and Craven Bros. cranes similar to those at Eveleigh.

Figure 3.90: Early photograph of the Carriage Lifting Shop in Derby Carriage Works at Litchurch Lane. The works was built in 1876 for the Midland Railway on a site of 128 acres. They were designed to handle carriage construction from raw materials to finished stock. By 1948, the site was the principal carriage and wagon works of the railway and employed over 5000 staff. In 1962, new wagon work ceased, repairs were drastically cut and the works was adapted to cater solely for carriage work which was still continuing at the site in 1992. Source: Larkin 1992: 109.

The site had a major wood working shop which handled timber from raw logs, and the works later produced steel and aluminium carriages. By 1948, it was the principal Carriage and Wagon works of the Midland Region. Wagon work was discontinued at the site in 1962 and it then catered for carriage works, which continue today in two of the original 9 sheds. The rest of the site is being developed into a “Pride Park” and contains some of the original workshop buildings, including a Roundhouse used for overhauling cranes (http://www.typetwo.freeserve.co.uk/brel).

Figure 3.91: The sawmill of the above works in 1922. The building arrangement is very similar to Eveleigh Locomotive Workshops with cast iron columns separating the bays. Unlike at Eveleigh, a separate structure appears to support the crane girders in the adjacent bay. The machines must be operated by electric motors or hydraulics as no line shafting is visible. Source: Larkin 1992: 109.

 In this section the original Bay numbers are used, 1-4, 4a and 5-15

Figure 3.92: Building wooden wagons of 12 ton capacity at Derby Litchurch Lane Carriage and Wagon Works during the period 1924-1930. Source: Larkin 1992: 138.

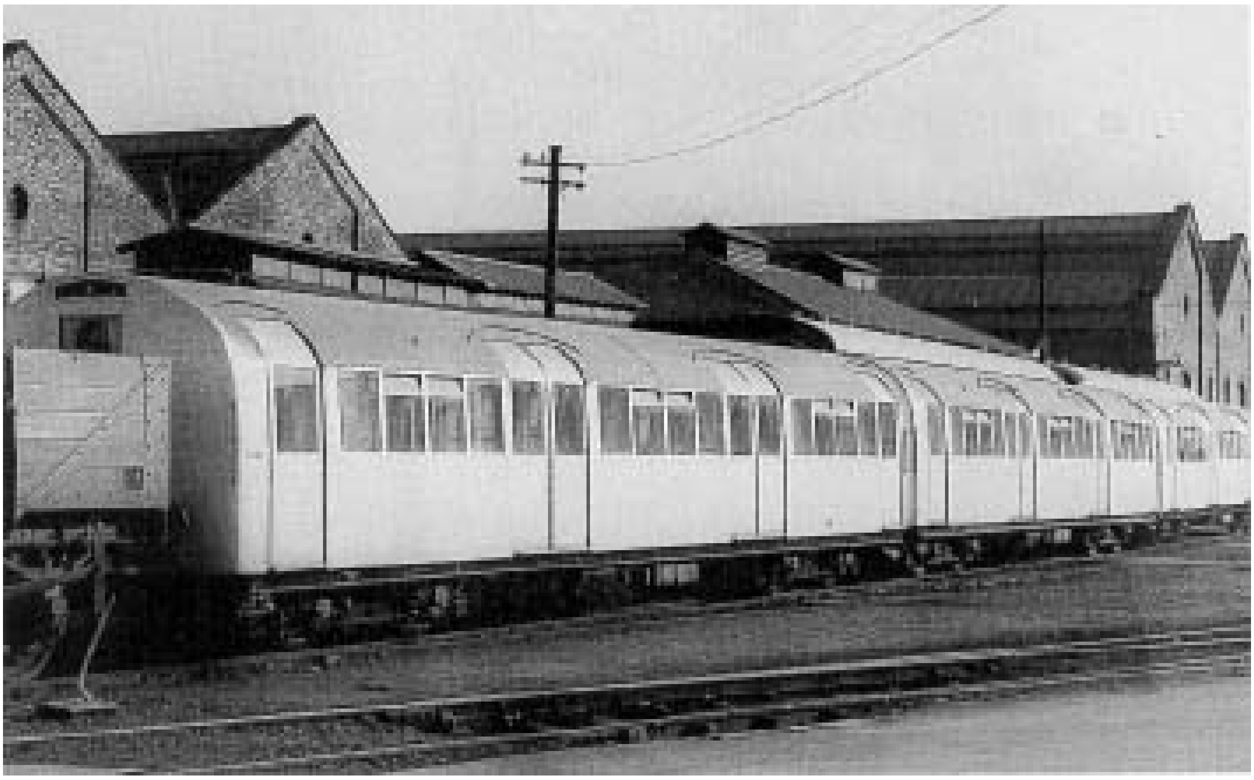


Figure 3.93: Carriages built for London Transport at Derby Litchurch Lane Carriage Works in 1962. Note the similarity of the gable ended workshop buildings behind to the Eveleigh Workshops main buildings. Source: Larkin 1992: 113.

Doncaster Locomotive, Carriage and Wagon Works, England, 1853 - 1889

This works was constructed on a site of 61 acres and provided facilities for locomotives, carriages and wagons. The carriage shop was originally built for repairs but was later reorganized to cater for carriage construction only. The locomotive shop was involved in construction of tank hulls and anti-aircraft projectiles during World War II.

The locomotive area has an external traverser between the engine shops, which contain longitudinal rails. A plan of the carriage workshops has not been found but photos show 3 sets of longitudinally arranged rails per bay.

In 1960, carriage construction was discontinued but repair work on carriages and wagons was continued until at least 1987 when the site was sold to the private sector.

Eastleigh Locomotive, Carriage and Wagon Works, England, 1891-1909

The Locomotive Works was built in 1909 and covered an area of 41 acres. Locomotive repair work from Ashford was transferred there in 1962.

The Carriage and Wagon Works covered an area of 54 acres and built and repaired carriages, wagons and containers. New carriage building was suspended during WWII when work concentrated on conversions of carriages for ambulance trains and construction of other military vehicles. Carriage work was transferred to the Locomotive Works in 1962 and the carriage site closed.

A fan of rails provided access to the erecting shop which contained longitudinal through rails. No plan has been found for the Carriage and Wagon Shops. The Locomotive Works was still engaged in the repair of locomotives in 1998 although it is not known whether this still continues.

Figure 3.94: Eastleigh Carriage and Wagon Works was built in 1891 by the London and South Western Railway Company on a 54 acre site. The works constructed new carriages and containers and repaired carriages, wagons and containers. By 1968, the repair work had been transferred to the Locomotive Works and the site was sold. Note the traverser, very similar to those at the Eveleigh Railyards, transporting a carriage in the foreground. Source: Larkin 1992: 141.

 In this section the original Bay numbers are used, 1-4, 4a and 5-15

Gorton Locomotive, Carriage and Wagon Works 1848, 1881 Near Manchester

The Locomotive Works was built in 1848 on a site of 30 acres and built locomotives for the War Department during the First World War. The six acre Carriage Works was built on an adjacent site in 1881. Only light repairs were undertaken at the site as the facilities were not large enough for heavy repairs.

The site included large fans of rails to the wagon, engine & erecting shops which all contained longitudinal rails. The wagon repairing shop had both external and internal traversers. This site is different from the Gorton Foundry surveyed by Forster. The Locomotive Works were closed in 1962 and a supermarket now stands on the site. The Carriage and Wagon Works were closed in 1965.

Horwich Locomotive and Wagon Works, England, 1887

The Locomotive Works were built in 1887 on a site of 81 acres and undertook tank construction during the Second World War. One of the buildings includes paired circular columns similar to the Eveleigh Carriage Workshops. A fan of rails runs to the Paint Shop which contains longitudinal rails - an arrangement similar to Eveleigh. The Erecting and Repair Shops have very long plans with internal traversers and longitudinal rails.

Locomotive repairs ceased in the 1960s but wagon repairs continued at the site. In 1982, the works closed but the Iron Foundry continued operation and was sold as a going concern in 1987. In 1915, Forster considered these one of the best laid out English repair shops.

Inverurie Locomotive, Carriage and Wagon Works, Scotland, 1903

This combined works was built in 1903 on a 15 acre site. The Locomotive area has a range of pits but it is not clear how items were moved between them. Longitudinal rails continue through the Carriage and Wagon Shop building to a turntable at the end. The works mainly undertook repairs. The site closed in 1969 because of a decrease in traffic.

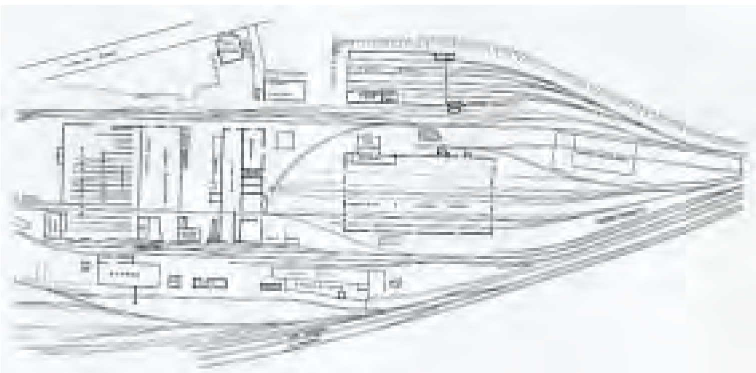


Figure 3.95: Inverurie Works. The Locomotive area is to the left. The Paint Shop and the Carriage and Wagon Shop on the right both have longitudinal rails and have access provided by fans of rails. Source : Larkin 1992: 82.

St. Rollox Locomotive, Carriage and Wagon Works, Scotland, 1853-1856

A combined works which covered a site of 15 acres and was built to undertake the repair of carriages, wagons and locomotives. The site contained fans of rails leading into the Machine, Paint and Carriage Shops, which also contained longitudinal rails. An external traverser was located outside the Carriage Shop. Sections and elevations in Forster's report show similar buildings to Eveleigh.

By 1992, St Rollox was the only main repair works remaining in Scotland. It was gutted and modified in 1964 and a new 7 ton internal traverser installed. The Carriage Works were amalgamated with the Locomotive Works in 1962 and, from 1972, they have been known as Glasgow Works or 'Caley' after the original owners, The Caledonian Railway. Although still operating, operations at St. Rollox have been significantly downsized.

Figure 3.96:St. Rollox (Glasgow) Railway Workshops. Source: Binney *et al* 1979: 170

Figure 3.97: St. Rollox (Glasgow) Railway Workshops. Source: Binney *et al* 1979: 171

 In this section the original Bay numbers are used, 1-4, 4a and 5-15

Stratford Locomotive and Carriage Works, England, 1847
These combined works which cover 31 acres were laid out on either side of the main line. A variety of light and heavy carriage repairs were undertaken.

The Carriage Works had long buildings with no traversers and, presumably, longitudinal rails. The carriage lifting shop, body shop and sawmill on the other side of the lines had longitudinal rails with external traversers. One building at the Carriage Works is constructed of brick walls and timber roof trusses and has arched headed windows similar to those at Eveleigh.

The works was closed in 1963 but the running shed was used after this time for various works.

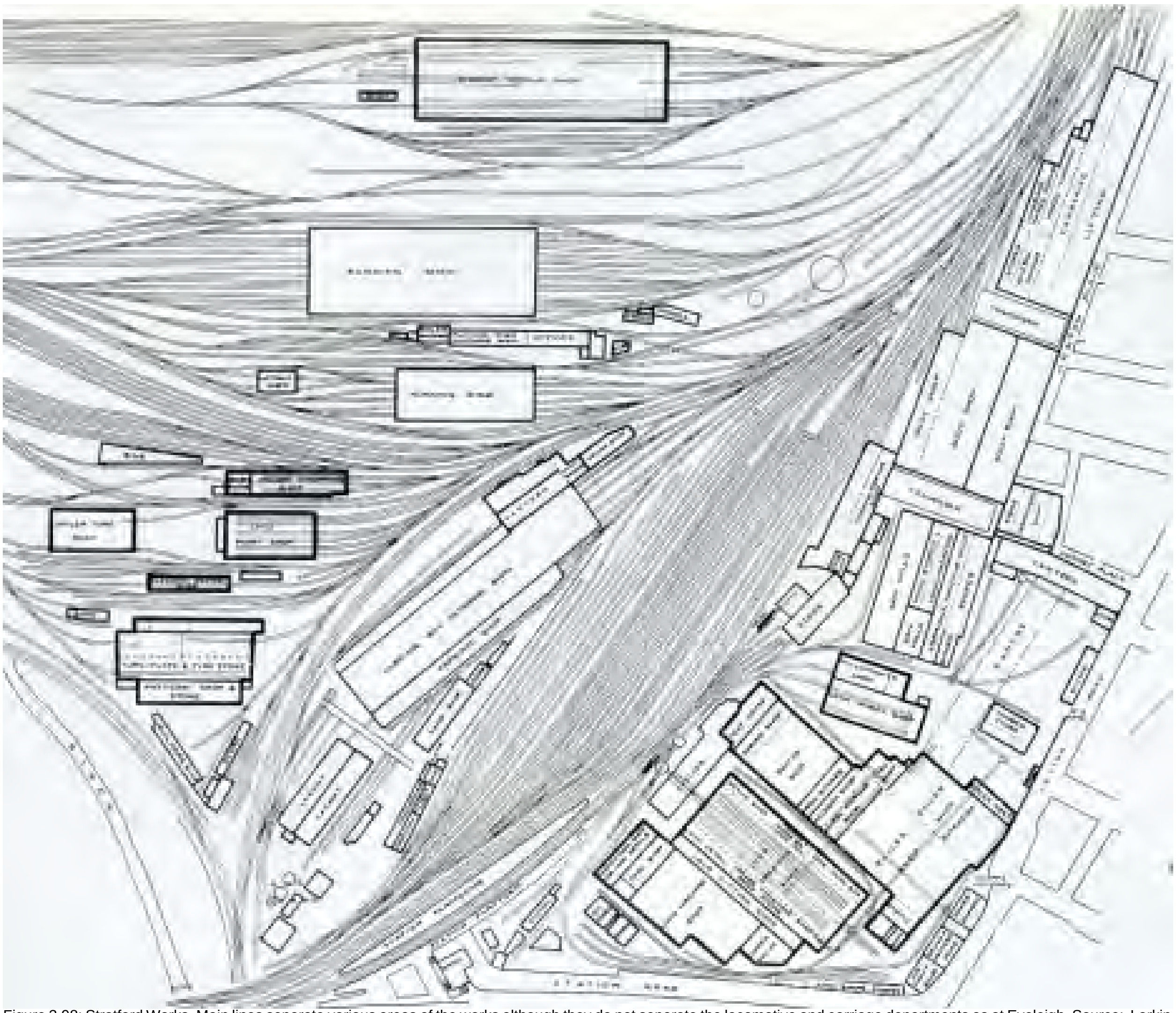


Figure 3.98: Stratford Works. Main lines separate various areas of the works although they do not separate the locomotive and carriage departments as at Eveleigh. Source: Larkin 1992: 90.

Swindon Locomotive, Carriage and Wagon Works, England, 1842, 1869.

The Locomotive Works was very large and covered a site of 140 acres. The Carriage and Wagon Works were built in 1869 and were separated from the Locomotive Works by the Paddington to Gloucester Line. The construction and repair functions of the Carriage and Wagon Works were themselves separated by the Paddington to Bristol Line.

The Erecting Shop and Tender Shop included internal traversers and transverse rails. At Swindon, the traversers also extend outside. The CME and Works Manager's offices were also on site.

The Carriage and Wagon Works closed in 1962 and their work was transferred to the Locomotive Works. After 1962, almost all new locomotive building work had been transferred to other works and repairs only were being carried out at the Locomotive Works. In 1986, the entire works was closed. Some overhaul work was re-established and railway museum approved 1992.

The former Swindon Railway Works have been converted in to a major railway museum, STEAM, featuring educational and corporate facilities (http://www.steam-museum.org.uk). (See also article from *Swindon Today*, later in this section). In addition, STEAM boasts a highly maintained web page with links to other railway sites in the United Kingdom.

Figure 3.99: Aerial view of the original wagon shops at Swindon taken in 1922. This was the largest concentrated repair unit in the United Kingdom but its activities were transferred to the Locomotive Works in 1967. Note the fan of rails which is similar to, but larger than, the fan at the Eveleigh Carriage Workshops. Source: Larkin 1992: 145.

 In this section the original Bay numbers are used, 1-4, 4a and 5-15

Wolverhampton Locomotive Works, England, 1855
Wolverhampton Locomotive Works was built in 1855 on a site of 14 acres and carried out locomotive building and repair. These works were the headquarters of the Great Western Railway's Northern Division under the supervision of George Armstrong. The site was surrounded by privately owned that was financially unobtainable by the GWR and the works eventually moved to Swindon (Bev Parker emaill: 31/05/02).

During the Second World War, the works manufactured components as well as repairing locomotives. Repair and rebuilding work continued until 1964 when the works was closed. Only retaining walls and peripheral features remain.

Wolverton Carriage Works, England, 1838
This Carriage and Wagon Works was built in 1838 on a site of 39 acres. It was originally constructed for locomotive repair but the locomotive work ceased in 1877 and the site began to be used for carriage construction and repair. The workshop reached its peak operational capacity in 1910.

During World War II, the works was used for the manufacture of glider sections, assault boats, bridge pontoons, dinghies, boilers and rafts. In addition, conversion of 700 vans to armoured vehicles was undertaken. General construction work ceased at the site in 1962, except for the saloons for the Royal train. It was noted in 1992 that, since 1977, some other new construction work had been undertaken at the site. The earliest building have been demolished and replaced with a supermarket and car park but the remaining workshops are operating to a decreased workload. The Wolverton workshops employ approximately 1000 staff who mainly work in coach refurbishment for private operators. The workshops are in private ownership under Railcare (http://www.ianrod.clara.co.uk/Commun.htm).

York Wagon Works, England, 1865
These works were built on a 17 acre site and were used for repairing wagons and horseboxes. By 1949, a mix of light and heavy repairs was being carried out at the site. Container repairs were also undertaken. The works closed in the 1960s and many staff moved to the York Carriage Works.

York Carriage Works, England, 1884
These works were built on a 45 acre site nearly twenty years after the Wagon Works. From 1958, multiple unit electric stock was built at the site. By 1992, the works was one of only two works manufacturing new carriage stock for British Rail. The York Carriage Works are no longer operating.


Figure 3.100: Lifting carriages at York Carriage Works - the general practice for lifting coaches on and off their bogies by means of two cranes. A similar technique would have been used in the Carriage Lifting area adjacent to the Paint Shop at Eveleigh Carriage Workshops. Source: Larkin 1992: 127.

Comparison

English examples demonstrate several types of buildings. 'The London and North-Western Railway (which owned the Crewe Workshops) developed some of the largest straight sheds seen, with multi-road buildings like the twenty five track example at Rugby. This shed, which was not a workshop, covered a large area but since the elimination of steam has disappeared completely. The sheds at Crewe North covered a huge expanse of land in the town centre, and were demolished and cleared in the mid 1960s, to remain "an empty waste of bulldozed rubble" (Binney *et al* 1979: 165). Such sheds are comparable with the now demolished running shed at Eveleigh.

Figure 3.101: The now demolished running sheds at Eveleigh. Source: ML Frame Number GPO 1 - 31981.

Another main type was the Roundhouse. These could be arranged in a group, for example at Hull Dairycoates. This was perhaps the largest shed ever built and included six roundhouses arranged in line and each accessible to the other. The most famous is perhaps the pair at York, now converted for the National Railway Museum. Relatively few British roundhouses remain that serve any useful purpose. Some, such as those at Kentish Town, North London, and Battersea Park are still in industrial, although not railway, use. Eveleigh never had a roundhouse though there are examples elsewhere in the NSW railway system such as at Goulburn and Junee.

"Alongside the engine sheds the companies also developed their own rolling stock construction factories, always known simply as `works'. Except in the very early days each private company built its own rails and sleepers and maintained its own civil engineering structures such as bridges and tunnels. New buildings like sheds, for example, regularly went to outside tender" (Binney and Pearce, 1979: 168).

New railway buildings and sites became redundant from the 1920s when the railways were grouped into four main companies. The depression of the 1930s also led to the closure of many sites and to work being taken away from many others. In the 1950s, decreasing traffic and new forms of traction meant that further cutbacks were inevitable. Many of the great engineering establishments of the nineteenth and twentieth centuries were wound down. According to Binney and Pearce virtually all British Rail's needs are now met by the plants at Derby, Crewe and Doncaster and work is tendered out. Many sheds did remain for a long time and new uses were found for only a relatively small number and the majority have been demolished.

 In this section the original Bay numbers are used, 1-4, 4a and 5-15

In England personal experience of the authors and comments of experts at the Ironbridge Archaeology Institute indicate that most of the once extensive number of workshops equivalent to Eveleigh have been demolished.

Swindon was originally much larger but much has been demolished, and a newspaper article below describes the redevelopment of the site. Swindon was similar to Eveleigh with a layout on either side of a mainline although it was much larger. There was a locomotive works and a separate carriage and wagon works .

An aerial view shows the fan of rails and the saw-toothed roofs in the wagon works which are very similar to the Eveleigh Paint Shop. Swindon would possibly have been a model for Eveleigh, as it would have been well known to Eveleigh's designers.

Swindon Today, 19 February 1997

FACTORY SHOPPING REVIVAL FOR FAMOUS RAILWORKS

Historic railway workshops in Swindon are being transformed into a £40 million factory shopping outlet, the largest retail regeneration project in the country. The Great Western Designer Outlet Village will accommodate around 100 shops and create up to 1,000 jobs.

The impressive development for BAA McArthur/Glen is set to open on March 13 following a 48-week fast-track construction contract by Tarmac Building.

"With this project we have created one of the best retailing environments in Europe," says J.W. Kaempfer, chief executive of BAA McArthur/Glen. "We anticipate around four million visitors being attracted to the Great Western during the coming year."

The Swindon site is within a conservation area where railway pioneer Isambard Kingdom Brunel founded the massive GWR locomotive works 150 years ago. Listed Victorian buildings including the old boiler shop, tank shop, brass shop and smithy have been sympathetically converted into nearly 200,000 sq ft of attractive shopping malls adorned with railway memorabilia.

One of the workshops houses a food court modelled on a 1920s railway station. The "booking hall" becomes a Harry Ramsdens fish restaurant and other food outlets will operate from beneath replica railway arches.

Visitors will also be able to see one of Britain's illustrious steam locomotives, the Swindon-built City of Truro, which in 1904 became the first train to exceed100mph.

Shoppers strolling through the malls can combine a modern retailing experience with a taste of railway history. Some of the original cranes, presses and other machinery have been retained as features within the malls so that shoppers can form a mental picture of the site's rich railway heritage.

The external appearance of the workshops remains largely unaltered but new structures have been erected to link them together. The most dominant is a fully glazed link connecting the food court with the shopping malls. A tented structure links two other buildings and provides cover for a children's play area.

Tarmac Building's project manager, Martin Nash, said: "We were not allowed to drill, cut, weld or screw anything to the original structure. Everything had to be reversible, so it was all clamped on to the existing steelwork or brickwork for ease of removal if necessary."

Coincidentally Martin, a Swindon man, was employed at the railworks as a coach builder before its closure. "In its heyday, 14,000 people worked here," he recalled. "By the time it closed in 1986, only 1,500 were left. It's given me immense pleasure to be involved in its rebirth and see jobs coming back again."

Parking for 2,000 cars and 24 coaches has been provided within the scheme and a refurbished pedestrian tunnel links the site with the main railway station and town centre. Future plans for the Great Western include a Railway Heritage Centre which would be a major tourist attraction in its own right.

Some of the workshops at Crewe and Derby are still in use railway but have virtually all modern machinery. The Crewe and Derby workshops resemble Eveleigh in their architectural style and in the comparably random layout of the yards. In particular the illustration of a bay of the Crewe Loco Works shows details such as the arched headed cast iron windows, light fittings and the Craven Brothers crane. The buildings had round cast iron columns and lattice girders and the roof trusses are also similar to Eveleigh except that they are composite with the top chord being timber. Crewe however had a layout with three longitudinal rails along each bay which seems to have been much more common than the transverse layout of the Eveleigh Locomotive and Carriage Workshop buildings.

Derby was one of the major nineteenth century railway towns, the ‘capital city’ of the Midland Railway Empire. Locomotives and rolling stock were built there, along with signalling and other equipment. Each of the three companies using the station had its own engine shed by the station. The North Midland’s Railway had a roundhouse later incorporated into the locomotive works established in 1851. The works expanded to include the nearby Litchurch Lane Carriage and Wagon works, built in 1876. By 1900, about 12,000 men were in railway employment in Derby.

The Locomotive Paint Shop was very similar to the Eveleigh Paint Shop in layout and it seems that the longitudinal layout with a fan of rails was typical for Paint Shops, sometimes supplemented by traversers or with through rails as at Eastleigh. Photographs of the Derby, Litchurch Lane, Works show similarities with Eveleigh. The Carriage Lifting and Waggon Works had transverse rails and sets of timber doors. There was a timber floor however and the superstructure appears lighter and more modern. Externally the works had brick gables with bulls eye vents and arched heads to three openings per bay.

In this section the original Bay numbers are used, 1-4, 4a and 5-15

These works also show many similarities with Eveleigh and were likely to have influenced the design, particularly the transverse layout. This works was known for handling the complete timber carriage construction process starting with the breaking down of whole logs. An illustration of the sawmill in 1922 shows a workshop that would have been very similar to Eveleigh. In the photo machines are individually powered and presumably have been converted from the original drive from line shafts. The building has a similar overall form but note that in the adjacent bay the crane girders are not integral with the structure but supported on separate columns.

Other smaller works also show similarities with Eveleigh. The small Bow Locomotive Works illustrated by Larkin show a building with round columns, crane girders, countershafting and a Craven Bros. crane. The end wall is brick with three bulls eye windows and a central top hung sliding door. The trusses are similar but are composite with the top chords being timber and there are roof lights. The layout however is longitudinal and there is a wood block floor.

Wolverton Carriage Works appears similar but also has a longitudinal layout. The floor appears to be bitumen with no pits and the columns are rectangular. It also has a brick gabled end and trussed roof with roof lights. A traverser very similar to those at Eveleigh is shown in action at the now closed Horwich Works.

Figure 3.102: Running Sheds at Hasland, near Chesterfield, built for the Midland Railway. This two-bay example is similar to the sheds at the Redfern Railway Yards (refer Section 3.1.2) and is of an earlier date than the Eveleigh Carriage Workshops. Source: Binney *et al*: 169.

3.10.5 Australian Interstate Railway Workshops

Railways and their associated buildings developed in Sydney, Melbourne and Newcastle from the early 1850s, in the mid 1850s in South Australia, in the mid 1860s in Queensland, in 1870 in Tasmania and in 1880 in Western Australia. All States had railway workshops and in some cases, there has been a succession of workshops for example Newcastle and Sydney. The construction of large-scale workshops coincided with the period of greatest expansion in the rail networks in the 1880s in NSW and Victoria but not until the first decade of the 1900s in Western Australia. Thus though the west Australian works (Midland Railway Workshops) are comparable in function and size they are a twentieth century complex.

The workshops in Melbourne, Newcastle and Perth have been assessed in detail by C&M Doring, and those at Launceston have been inspected by the authors of this report and are compared to Eveleigh in this report. The facilities at Ipswich, Queensland and Islington in Adelaide are not known to the authors and are not commented on in detail. An illustration of the Queensland Government Railway running shed in Brisbane in the steam age shows corrugated ironclad, timber-framed sheds with repetitive gabled profile. Neither the Queensland nor South Australian works are of the scale or substantial character of the other major workshops.

Carl and Margaret Doring state that *few 19th century Railway Workshops still survive anywhere, but it so happens that two of the biggest and best in the world have survived in Australia, one at Eveleigh NSW and the other at Newport Victoria. Both were established c. 1888. Both are outstanding examples of industrial heritage ... Enquires made to overseas experts ... revealed that the combination of buildings and equipment at Eveleigh was superior to that of any know surviving 19th century workshops in USA and probably superior to those in UK with the possible exception of the Crewe Workshops* (Doring 1988: 3).

In this section the original Bay numbers are used, 1-4, 4a and 5-15

Newport Workshops, Melbourne

The Newport Workshops in Melbourne are comparable in nature and scale to Eveleigh and were built at the same time. *The layout and building design was based on the best British railway workshops and the high quality of architectural design and building craftsmanship reflect the time of booming prosperity and confidence in Victoria* (Doring 1988: 1). They were designed by architects Breretin & Lewis and reputedly based on British Workshops. As an integrated complex and in their design they are considered by some to be superior to Eveleigh.

Carl and Margaret Doring write that *Newport is superior to Eveleigh in the quality of its buildings, in the range and completeness of its machinery groups, and in the importance of some outstanding individual items of equipment*. One of the major differences is that the locomotive and carriage sections are on the same site, uninterrupted by running lines. At Eveleigh the main lines separate the Locomotive and Carriage Workshops. These differences are deliberate design features of each complex with the Eveleigh layout intended to maximise access to the main line. The two complexes serve as examples of different design approaches to railway workshops (Refer Section 3.1.4).

The Newport Workshops are arranged differently from the Eveleigh complex. The sheds are located at the end of a large fan of rails which extends to the southwest of the Williamstown line. Central to the complex is an administrative building with a clock tower. The Locomotive and Carriage Workshops, or the West Block and East Block respectively, are on either side of central administrative and power facilities. A 'road' ran across the centre of the complex linking all sections of the operations. The West Block included the ironworking shops and the East Block the woodworking shops which included the areas for carriage and wagon repairs, the paint shop, upholsterers and the saw mill. Close by were the timber shed, timber store and the plating shop.

Doring states that for many of the years of the century 1888 to 1988 Newport Workshops was one of Victoria's largest and best equipped engineering establishments with up to 5000 employees on site building and maintaining steam locomotives and other rolling stock and also making nuts, bolts, dog-spikes, pick handles, tarpaulins and other basic stores for railway use. Newport Workshops even made many of its own machine tools. This is similar to Eveleigh in its role in the NSW railways.

The Victorian and NSW railways followed the same trend in building rail motors in their workshops from about the early 1920s. The Victorian Railways' carriages were ahead of NSW in quality starting from the 1937 Spirit of Progress (which was built and maintained at Newport).

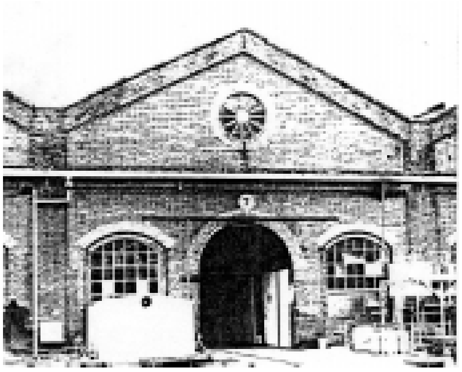


Figure 3.103: Newport Railway Workshops, Melbourne. The composition of the building is less formal than Eveleigh. At Newport the gable is expressed as a pediment and the windows are semicircular arches. Generally the buildings are similar with face brickwork divided into bays and forming a parapet, polychrome work around openings, the bulls eye window and the central opening, Doring, Newport.

The Newport Workshops are similar in overall form to Eveleigh. They have a series of bays with brick external walls, double pitched roof with top lights, each bay with a central door and cast-iron windows on each side. The composition of the brick walls is similar to Eveleigh with pediments and semicircular arches to the doors. The windows however have segmental arched heads and there are no stone dressings.

Internally, the columns in the East block, which has no cranes, are single and round in section. In the West block the columns are twin H sections which at first give the appearance of the later rolled steel joists. Remarkably, they are cast iron and the twin columns are in fact part of one casting.

At Eveleigh the columns are round and are much more classically derived. The designers at Newport were possibly attempting to achieve a more 'modern' appearance with their columns. The trusses were not analysed in the Doring report on Newport, but from photos appear to be riveted angles with a flat bottom chord (i.e. at level of column tops) and span 45 or 47 feet. As at Eveleigh there were many later buildings but they were of varying quality and value.

Figure 3.104: Newport Railway Workshops, Melbourne. Historical view of half of the complex which is repeated to the left of this photo. Note the configuration of the building in bays and how the fan of rail lines serve each bay, Doring, Newport.

In this section the original Bay numbers are used, 1-4, 4a and 5-15

At the time of the Dorings' study of 1988 much machinery was intact, showing the whole range of functions. Since then the complex has largely been stripped with much machinery sold for scrap. The main buildings are being conserved, while ancillary buildings have been removed leaving equipment of world significance, e.g. the 1860 Kirkstall steam hammer and mechanical crane, exposed to the weather. Difficulty has been experienced in finding new uses because of the high level of contamination of the site.

Today the workshop site of the former Victorian Railways at Newport is still used for a number of rail activities. On the eastern side, some modern buildings dating from the 1920s are used as a maintenance workshop for Melbourne suburban electric trains, and one is equipped with state of the art jacking equipment (ability to lift a three car train 3m high with jacks under each of six bogies). The building was recently extensively upgraded and modernised for this purpose and could be in this use for many years.

Another building in the area is leased to Goninans for train maintenance, another used for bogie repairs of all types. An extensive area on the east side is now set aside in a secure area for storage of electric trains between trips for cleaning, etc. The former foundry is closed down and used for storage.

The East Block, the former wood working shop, is completely full as a storage for out-of-use Melbourne electric trams, a few unique cable trams, and a Sydney tram. They are standard gauge, 4'8 1/2" (1435 mm) while the rails inside are 5ft 3ins, (1530 mm), so some wheels sit on rails and some on concrete.

Part of the centre office block containing the clock tower has subsided slightly and has to be restored. It is empty but not derelict and the clock works and is maintained. The West Block is entirely used by rail heritage groups who are building and installing an engine turntable outside the building for turning steam (and any other) vehicles. This turntable (note this is not a traverser) was once used for electric carriages at Jolimont near Melbourne (since closed). There are no traversers on the site, despite its much broader layout, three or four times the width of Eveleigh Carriage Works Paint Shop.

There are also similarities between the character of original buildings/extensions/machinery at Eveleigh and Newport - original structures from the 1880s are brick, extensions of 1910-15 are steel but there is also much timber and corrugated iron; later buildings from the 1920-30s are all steel.

Midland Workshops, Perth

The Midland Workshops in Perth were constructed between 1904 and 1912, with continuing additions. They were in operation in 1993 when surveyed by C and M Doring but are now closed. The main building has a structural steel frame of rolled steel sections riveted together in lattice style. It has a saw tooth roof and the external walls are brick divided simply into bays with a straight parapet. The window frames are cast iron. As dictated by their function, the workshops have long wide span bays with overhead cranes, the bays arranged side by side. This is as for Eveleigh and Newport but the character of the buildings is substantially different from Eveleigh because of their later construction date.

Though not as large as Eveleigh or Newport, Midland has a more comprehensive collection of workshops and its machinery and plant were all in working order in 1993. The functional layout is more sophisticated at Midland reflecting the later date of construction. The future of the workshops is uncertain and plans for complete demolition and redevelopment have been abandoned because of the prohibitive cost of decontamination.

Launceston Railway Workshops

The Launceston Railway Workshops are closed and have been redeveloped, in part, as a rail museum. They are a smaller scale complex and though the buildings represent a range of functions much of the machinery has been stripped. The buildings are generally of timber and iron with some recent major concrete framed buildings. Here the buildings are arranged around a central external traverser more similar to some of the American yard layouts than the British.

Mile End Railyards, Adelaide

These workshops, located close to the Adelaide Central Business District, were built in the early 1900s. It appears that they undertook day to day maintenance of steam engines until the 1950s and diesel engine maintenance until 1990. The character of the early buildings on the site is not known but a number of buildings on the site were demolished in July 1994. In a 1995 report (refer Bibliography) it was noted that the 1950s Diesel Depot was also proposed for demolition. A turntable was proposed to be relocated from its original position to a different area of the site.

The site has now been redeveloped and an Athletics stadium has been built in the centre of the site. A Netball Stadium was proposed at the southern end of the site, and residential development was proposed along its western boundary. The authors have been informed that the Netball stadium is now under construction. It therefore appears that most of the railway workshops buildings have been demolished.

 In this section the original Bay numbers are used, 1-4, 4a and 5-15

3.10.6 Other New South Wales Workshops

Eveleigh was the major railway workshop in NSW but it was supplemented by some smaller workshop at regional centres where running repairs were carried out. All major repairs were carried out at Eveleigh.

The Honeysuckle Workshops at Newcastle were established in 1875 separately from Eveleigh because at that time there was no rail link between Sydney and Newcastle. These works are described below but the other, smaller regional workshops are not described in detail. The workshops at centres such as Bathurst, Goulburn and Lismore were generally corrugated iron sheds, the early examples with pitched roofs.

A New South Wales Royal Commission into the Railway and Tramway Services in 1924 reported on the number of staff ‘engaged in the repairing of carriages’ and the findings are listed in the table below.

Eveleigh was obviously the largest employer in NSW. This century Eveleigh was also supplemented by the construction of major new works in the Sydney suburban area. The works at Chullora took over the role of rail motor manufacture and later repairs, particularly of the electric carriages. By 1910 the Clyde Engineering Company was the major private locomotive builder in NSW and it changed from steam to diesel-electric production in the 1950s. A few locomotives were also built at the Railway’s Cardiff Workshop.

Table from the 1924 Royal Commission showing the numbers of staff employed in repairing carriages at various workshops in New South Wales. Source: Report of the Royal Commission of Inquiry into the Railway and Tramway Services, 1924, p 175.

Workshop or Running Shed	Officer’s Staff	Clerical Staff	Wages	Total
Eveleigh Carriage Shops	39	27	1213	1279
Honeysuckle	-	-	46	46
Lismore	-	-	13	13
Sydney	3	4	90	97

Honeysuckle Point Workshops

The Honeysuckle Point workshops are contemporary with Eveleigh and the former Locomotive Boiler shop was designed by Cowdery and has the same double columns and lattice girders as Eveleigh. They support an 1884 Craven rope drive crane which has now been restored and is the only known example in Australia with intact rope drive. The buildings however are much smaller (2 bays wide) and the bays are much narrower and are spanned with timber trusses. Recent works have stripped many of the relics associated with the railways but the building has been restored as part of the upgrading of the Newcastle waterfont. It is no longer in railway use.

Figure 3.105: (Above) Honeysuckle Point. Detail of former Locomotive Boiler Shop, showing brickwork detailing, stone sills and cast iron windows, Doring, Honeysuckle.

Figure 3.106: Honeysuckle Point Workshops, NSW, Interior view. Note the double columns and lattice girders, identical to Eveleigh. The roof trusses are timber, Doring, Honeysuckle.

4. PHYSICAL ANALYSIS

4.1 METHODOLOGY

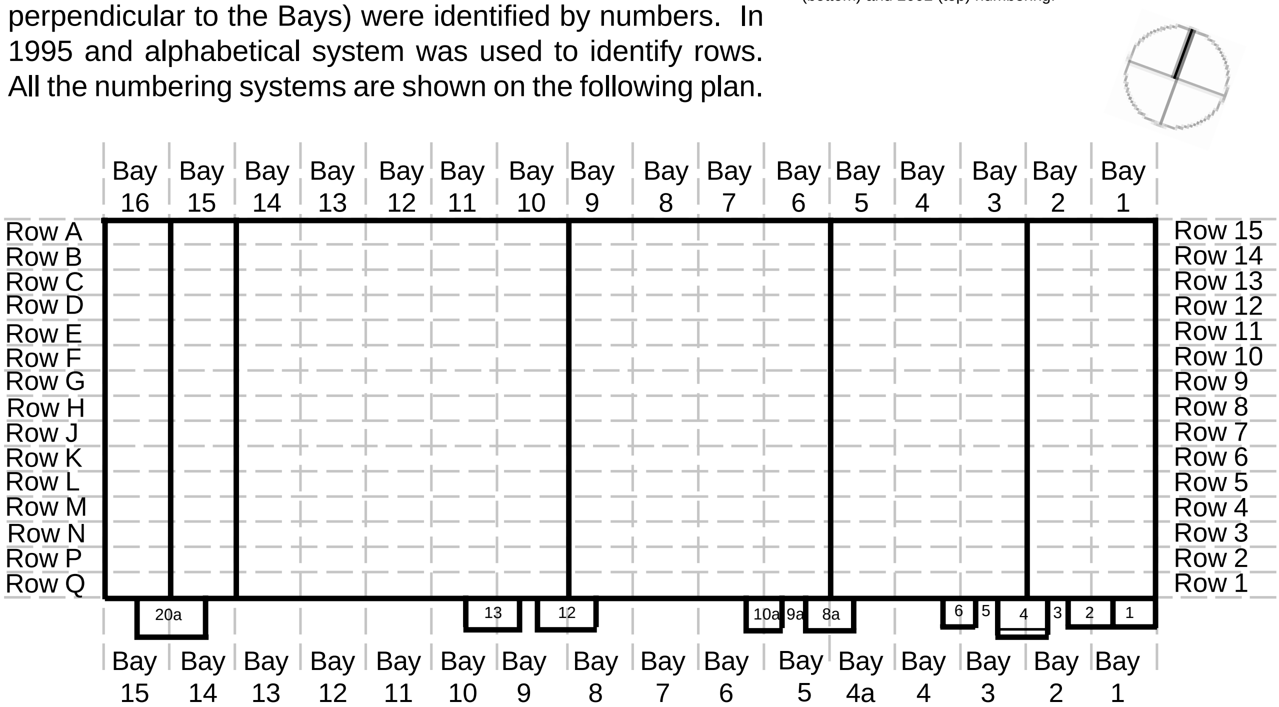
The 1995 architectural analysis of the building was based on inspections by Otto Cserhalmi, Jean Rice and Don Godden during February and March 1995. The structural analysis was based on inspections by Jim Loke.

This section generally describes the building's design and construction and assesses it structurally. The building is considered element by element and its condition summarised. The machinery is then described in terms of the systems, assemblages and collections.

The inventory is a separate document that is being updated concurrent with this report. The inventory comments on condition and significance and recommends appropriate treatment. Recording of the building by means of video should be considered in the future.

The numbering system used in the 1995 Conservation Management Plan was consistent with that previously used by Rice Daubney in other reports. The numbering system has since been altered with Bay 4a becoming Bay 5 and Bays 5 – 15 becoming respectively Bays 6 – 16. The numbering of the annexes has not been changed and those demolished since 1995 are not shown here. This CMP uses the current Bay numbers witht the old numbers in brackets to allow cross reference to previous report or historical documents. Similarly prior to 1995 the Rows (running perpendicular to the Bays) were identified by numbers. In 1995 and alphabetical system was used to identify rows. All the numbering systems are shown on the following plan.

Plan 4.1: Plan of the Locomotive Workshops showing the 1995 (bottom) and 2002 (top) numbering.



4.2 GENERAL DESCRIPTION

Building Design and Architectural Style

The design of the Locomotive Workshop is typical of similar buildings in Australia and derives from English models (see section 3.3). It conforms to the international construction idiom developed for heavy engineering workshops with brick external walls, internal cast iron columns, and long span trussed roofs with top lights.

In operational terms it was poorly laid out as dictated by the site constraints with a clumsy system for moving items. In architectural and engineering terms it is a highly sophisticated example of the type.

The main part of the building comprises parallel bays. Bays 1-4 are 60 foot wide and Bays 6 - 16 (old Bays 5-15) are 50 feet wide. The building was originally two separate structures with the space between being filled in to form Bay 4a. Hence the brick walls on both sides of Bay 5 (old Bay 4a) were originally the external walls. The wall between Bay 4 & 5 (old Bays 4 &4a) was then removed. The configuration of the building is shown on the plan illustrating row and bay numbers and numbers the annexes. The external expression of the bays is in brick walls modulated into bays. Each bay features a pediment and central doorway with flanking windows all with semicircular arched heads. The end walls featured blind openings alternating with windows and a central door. The whole is carefully and completely composed in the neo-classical tradition.

Figure 4.1: Bay 5 (Old Bay 4a), west wall looking south. This was originally an external wall with the column and crane rail added when the bay was enclosed. Photo: Jean Rice 1995.

The design is consistent and thorough to the smallest element forming a unified integrated whole, which is still largely intact. The design features the exposure of the structural system, acceptable in a factory but extremely exacting in construction terms. Even the underside of box gutters are seen internally as architectural features. Such integrated design demands very high levels of accuracy and high levels of skills and craftsmanship.

The engineering design of the building is very advanced for its time and shows the highest level of engineering expertise. Architecturally it is of the late Victorian period. Its symmetrical composition generally and within each bay, and the detailed features described above are Neo-Classical in character. The design of the classical columns and facade is executed with a high level of skill and is a late example of the style. At this time other buildings were already exhibiting features such as Newport's H-shaped columns or riveted construction. It can be surmised that as these were Cowdery's first buildings he may have drawn on his knowledge of English examples of some 25 years previously for architectural inspiration. His English experience also exposed him to leading edge iron technology perhaps giving him the understanding demonstrated by the finesse of the truss design. Alternatively, the architectural style may have been directed by the Railways Department.

Compared to similar buildings in Australia, this building is large with longer spans and is well composed and refined architecturally. The building maintains a high degree of authenticity with few alterations.

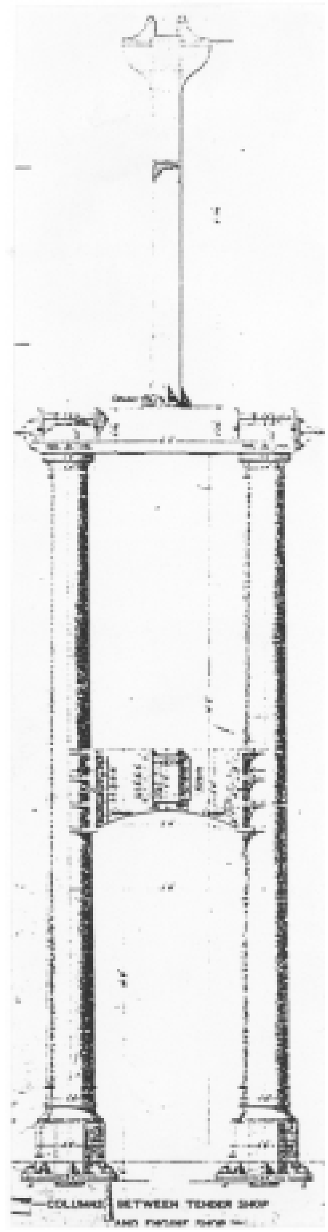


Figure 4.2: Elevation of double columns. Source: SRAO ELW19

Internal Planning

The building has a rectangular "footprint". The interior of the building originally comprised large open bays with open views in both directions across the building and diagonally. There was a wall between Bays 4a/5, 13/14 and 14/15 creating the major internal subdivisions. Spaces have now been subdivided with Bays 1 & 2 and Bays 10 – 14 (old Bays 9 – 13) being the only remaining open bays.

Formerly the internal planning was defined by rail tracks or "roads". There was a central road the length of the building and along each long side externally as shown on the historical plans in Section 3.

There were roads along the centre of bays 1, 2, 3, 4, 5, 10, 11, 12 (old bays 1, 2 3, 4, 4a, 9, 10, 11). Bays 8 & 14 (old Bays 7 & 13) had a traverser which served 15 sets of dead end rails in each of Bays 6, 7, 9, 13 (old Bays 5, 6, 8 and 12). This configuration meant that items had to be taken outside the building to be moved from bay to bay.

These features are believed to be intact under the floor and are visible in some areas. Overhead cranes run the length of Bays 1N, 3, 4, 5, 7, 9, 10, 11, 12, 13, 14, 16N (old Bays1N, 3, 4, 4A, 6, 8, 9, 10, 11, 12, 13, 15N). Originally wall mounted steam engines are believed to have been located on the south wall of Bays 3, 9 & 11 (old Bays 3, 10, 12) and possibly elsewhere. It can be expected that remains of these engines and the line shafting associated will be found in these areas.

Figure 4.3: Rails revealed during construction work in 1996. Photo: OC+P 1996.

This configuration has changed many times and the associated machinery moved, so Bays 7 – 14 (old Bays 6-13) were open spaces. When vacated by the railways Bay 1 North was altered to accommodate the Davy Press, Bays 1 South, 2 & 3 still contained forges etc lined up across the building with the centre road free. Those in Bay 3 were moved for adaptation for the ATP. Equipment moved from other bays was stored in Bays 1 & 4 in 1995 with those areas fenced off.

Figure 4.4: Bays 10 - 14 (old Bays 9 - 13). The building's footings were exposed during works to assess the efficacy of the downpipes and associated drainage system. Photo: OC+P 1996.

Bay 5 (old Bay 4a) S was empty and 5N (old Bay 4aN) was fenced off as an historic materials store in 1995. Bay 6S (old Bay 5S) had the mezzanine built for the army in World War 2 (later the canteen) and the more recent mezzanine was over Bays 6 & 7 (old Bays 5 & 6N).

Bays 15 & 16 (old Bays 14 & 15) are enclosed by brick walls and Bay 16 S (old Bay 15S) has an older mezzanine with office subdivisions. Bay 16 N (old bay 15N) was open except for some recent small enclosures in 1995, and has been subdivided since 1996.

Modifications in 1989 were made for Paddy's Market including concrete block fire tunnels leading from the centre road to the north wall and a concrete block wall between Bays 4 and Bay 5N (old Bay 4aN) which has since been replaced with a new wall.

The internal planning, in particular locations of rails, traversers and pits, indicates the location of potential archaeological remains.

Building Construction

- Brick Walls

The external walls are of sandstock brickwork laid in English bond with arched window and door openings picked out in white bricks. The brickwork is very well laid with tight and regular joints and the walls are generally 18 inches thick. The pediments have circular vents filled with louvres now replaced with solid panels. The brickwork is modulated into bays forming piers that strengthen the walls. There are no expansion joints - the wall apparently relying on the lime mortar to take up movement or growth. The piers do not extend up into the pediments allowing some concern about their lateral stability. The walls are generally not well connected to the purlins or trusses in the area of the gables. The windows and doors have semicircular arched heads constructed with specially shaped splayed bricks that allow very tight mortar joints.

The condition of the brickwork is generally excellent though it is dirty and the polychrome work obscured in many areas. The eastern wall was aggressively cleaned prior to 1995, seriously damaging the bricks by removing their hard face and exposing the soft interior. This damage was repaired in 1996. For conservation reasons it may not be necessary to clean the brickwork unless the deposits are detrimentally affecting the brickwork. It is recommended that samples be taken to analyse the nature of the deposits to assess if cleaning is necessary and to determine how the wall could be cleaned without incurring damage. The walls have an asphalt damp proof course above the stone base course. This appears to be functioning well and it should not be allowed to be bridged by construction works or by building the ground up.

The structural assessment in the 1995 Conservation Management Plan detailed brickwork cracking in the south and north east corners and in the east wall where downpipes are embedded in the wall. These areas were also subject to lateral damp evidenced by the symmetrical patterns of salt deposits at the downpipes. In some areas there was also associated plant and mould growth. The downpipes have now been placed on the outside of the wall and the wall conserved. The east wall along with internal columns has been underpinned and the brickwork repaired. Gables still require work.

There are internal early brick walls between bays 14 and 15 and bays 4a and 5. The latter was originally an external wall and is detailed as such, including one cast iron window. The walls of Bay 5 (old Bay 4a) have dry pressed bricks as they were constructed at a slightly later date.

Figure 4.5: East wall, Rows 1 - 6, prior to conservation work. Photo: Jean Rice 1995.

Figure 4.6: Detail, south wall Bay 14 (old Bay 13), showing early infill to the traverser opening removed during 1996. Photo: Jean Rice 1995.

Figure 4.7: South Wall Bay 8 (old bay 7) showing the traverser opening with haphazard infill construction. Photo: Jean Rice 1995.

Figure 4.8: Detail showing the asphalt damp proof course. Photo: Jean Rice 1995.

- Parapets

The brick walls feature sandstone cornices, parapets, sills and base courses. The stone generally extends the full depth of the wall. The top face of the parapets (and cornices) are splayed to fall to the outside to discharge water and they are joined on the top face by cast iron toggles - about one inch thick. In some cases there are cracks in the stone adjacent to the toggles caused by movement between the stone and cast iron toggles. On the pedimented areas, roof flashings are recessed in a trench in the stone. The stone cornice is badly deteriorated and has been assessed by a stone mason to determine what repairs are necessary. Some replacement is required along with patching and other methods to restore the function (i.e helping the building shed water). The works required have been documented but not carried out.

Figure 4.9: Typical example of stone cornice deterioration. Photo: OC+P 1996.

Figure 4.10: Collapsed section of stone cornice a result of deterioration. Photo: OC+P 1996.

A mason has also checked the copings & cornices. The sills are physically damaged in areas but are mostly structurally sound. Repairs required have been documented. In general stone should not be removed unnecessarily nor sections broken off as it will allow water into the walls below. Stones, which can be repaired in situ, should be. Many stones are being damaged by rusting steel inserts, which should be removed, and the hole patched

- Footings

The walls, and the internal columns, are supported on massed brick footings. In Bays 1-4 there are brick arches between piers and each pier is supported on a timber platform and timber piles, 12 in each corner and 6 at each column. This was said to be because of the sandy soil. Those in the NE corner and at various locations in the building were badly deteriorated and underpinned during adaptation for the ATP. The drawings show no piles in Bays 6 – 16 (old Bays 5-15) and there is not enough information to know whether the soil conditions are different or whether it is a different constructional technique. These footings show no signs of deterioration.

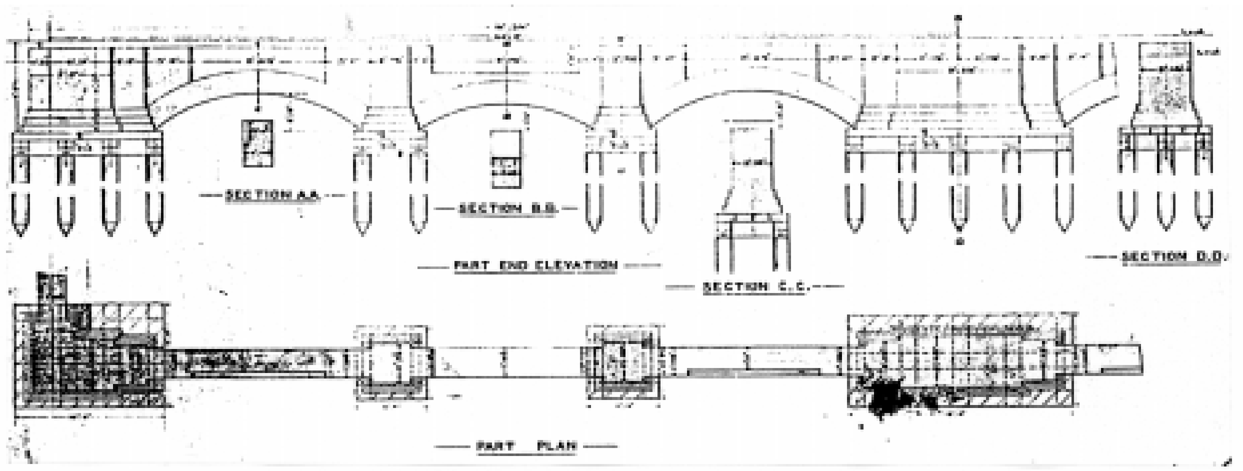


Figure 4.11: Foundations, part plan and elevation showing the timber piles. Source: Extract fron plan from SRAO ELW 2.

- Columns

Inside the building is a grid of round, hollow cast iron columns moulded in a classical style. They are supported on footings as above and are described in detail in Section 4.5. The columns support both the crane girders and the roof and originally supported line shafting. There is also a range of bolt-on brackets supporting other services such as the 4" hydraulic lines between Bays 1/2 and 2/3. The layout was changed several times early in the building's history and rows of additional columns added. They appear to be the same but have not been inspected in detail to assess if makers names vary.

Figure 4.12: Column grid, Bay 6 looking north-west. This area has since been enclosed with construction. Photo: Jean Rice, 1995.

- Trusses

The roof is supported by fine wrought iron trusses with diagonal wind bracing, which fixes through the walls at each end. The purlins are wrought iron Z's and the iron was originally fixed with bolts which clipped under the purlin. Timber purlins have been added in some places for ease of fixing replacement roofing. Monitor roofs run the length of the bays with a curved roof supported on curved wrought iron rafters. The trusses differ slightly in Bay 5 (old Bay 4a) as these were installed at a later date. At the north end of Bays 3, 4 and 5 (old Bay 4a) are elevated sections of roof which are highly distinctive features in views of the place. Their function is not clear but is presumed to be related to boilermaking.

Figure 4.13: Detail of end of roof monitor showing metal louvres. These may have been removed in 1996. Photo: OC+P 1995.

- Roofing

The roofs are clad in "corrugated iron" most of which was no more than 20 years old in 1995. There are some areas which have original or early roofing which has a larger pitch and is much thicker gauge e.g Bay 2, south, monitor roof and part main roof. Closer inspection may reveal a maker's name, some early iron is stamped NSWGR. Any surviving early iron should be conserved. The whole roof was oversheeted in 1996 creating an insulation layer between the two layers of roof sheeting.

Figure 4.14(above) & 4.15(below): Original rooflights from outside and inside . These were removed in 1996. Photos: OC+P 1995.

The original roofs had extensive areas of glazing below the monitor roofs. The configuration of this glazing remained only in Bay 16 (old Bay15) West but was removed in 1996. The remainder of the building had sections of translucent corrugated fibreglass. Parapet flashings and roof/monitor junctions has been haphazardly repaired over time and new flashings were installed with the new roof. The monitor roofs have heavy gauge iron louvred sides in good condition and some of the original detailing at the ends remained and was conserved. None of the original monitor guttering, (shown on the drawings) is known to have survived (or it may not ever have been built). The monitor sides were enclosed in 1996.

-Other

Windows and doors are described in following sections and are consistent with the building type. Openings to the traverser bays 8 & 14 (old Bays 7 & 13) are different comprising a full width opening to accommodate the traversers, which came out of the building to link with the rails. The wall above is supported on a large riveted plate girder. The original doors no longer exist and are shown on the drawings to be riveted steel plate construction and to fold and slide along the inside of the wall. They are visible in early photos. These openings were enclosed by poor quality later construction and in 1996 were replaced with new glazing (Bay 8) and vehicle doors (Bay 14).

Modifications to the construction of the main block in 1995 included the Bay 6 & 16 (old Bays 5 and 15) south mezzanines - both of some significance and detracting little from overall significance. A lift motor room protruded from the Bay 16 (old Bay 15) roof detracting from the aesthetic value. The mezzanine in Bays 6 & 7 (old Bays 5 & 6) north had no significance itself. It was not highly intrusive but detracted from the appearance by obscuring the bay structure and because of the crude external opening in the north wall. This was replaced with new mezzanines in 1996.

The original construction of the floor is not known. There where extensive sets of rails and pits in Bays 6, 7, 9, & 13 (old Bays 5, 6 8 & 12) which were covered with bitumen or concrete in 1995 and a new slab was laid over them in 1996. They should be excavated only if necessary and with care and under the supervision of an industrial archaeologist. Some areas e.g Bay 1 were always dirt and should remain so for interpretation and usage - site remediation allowing.

-Annexes

Along the south side of the building are a series of annexes. Some are part of the original construction (2, 4, 6, 12, 13), and others are early construction of some value (1, part 7, 19, 21). Annex 1 has been retained and Annexes 7, 19 &21 removed. The remainder are later structures mostly toilets and awnings of little value. Some were very intrusive (11) and have been removed. This method of providing extra facilities was part of the original design of the building and is an appropriate way to add facilities. There is known to have been a very large chimney, possibly between Annexes 2 and 4 at the southern end of Bay 2. It provided flues for the boiler house, casehardening shop and a main flue to the workshops (shown on the plan of the chimney). The underground flues probably still exist. Similar annex structures were originally in Bay 5 (old Bay 4a) before it was roofed in. Sub-surface remains exist, especially of the core store which had an underground space. They were disturbed during 1996 works but some remain.

Figure 4.16: Typical blank arch. Photo: Jean Rice 1995

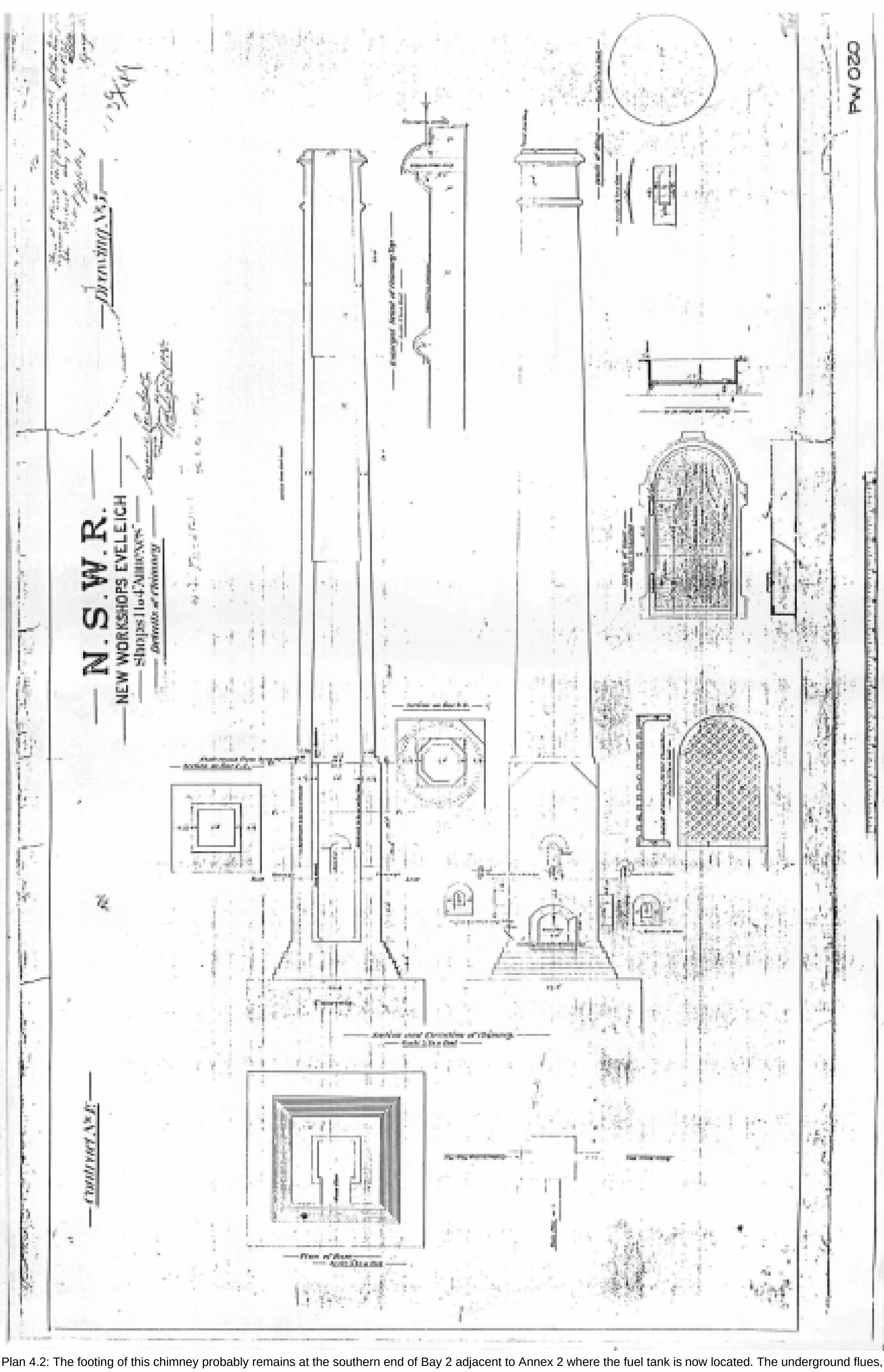
Figure 4.17: Typical window. Photo Jean Rice, 1995

Annex 1: Skillion roofed structure over De Burgue electric shears.
Annex 2: Case Hardening Shop, brick & stone with lantern to roof.
Annex 3: Skillion over entry to Bay 2.
Annex 4: Boiler House, brick and stone with lantern roof and additional skillion to south, all over four C36 class boilers
Annex 5: Skillion over entry to Bay 3.
Annex 6: Hydraulic Engine House, brick and stone with lantern roof housing hydraulic pumps and steam engines.
Annex 7: Skillion, part brick/part cgi walls, staff area & garage, now demolished.
Annex 8: Skillion over entry to Bay 4a, now Bay 5, and now demolished.
Annex 8a: New annex, metal framed and clad.
Annexes 9-11: Modern toilet blocks and shelters, now demolished
Annex 9a: New platform with air conditioning fan coil units.
Annex 10a: New annex, metal framed and clad.
Annex 12: Former Cleaning Room then tool sharpening, brick and stone with lantern roof, small skillion toilet addition on south.
Annex 13: Former Boiler House, brick and stone, lantern roof.
Annexes 14-18: Modern toilet blocks and shelters, now demolished.
Annex 19: CGI fuel store with sand floor, now demolished.
Annex 20: Modern toilet block, now demolished.
Annex 20a: New annex, metal framed and clad.
Annex 21: Remains of early toilet facilities at first floor level, now demolished.


Figure 4.18: Annexes 1 & 2, South Wall. Photo: Jean Rice 2002.


Figure 4.19: Annex 12, South Wall. Photo: Jean Rice 2002.


Figure 4.20: Annex 13, South Wall. Photo: Jean Rice 2002.



Plan 4.2: The footing of this chimney probably remains at the southern end of Bay 2 adjacent to Annex 2 where the fuel tank is now located. The underground flues, shown here in cross section, probably also still exist. SRAO ELW PW020.

Adjoining Spaces and Features

The building was formerly surrounded by rail tracks, turntables etc, which were an integral part of its function and are important in interpreting the function of the building. As the whole yard expanded, these inter-relationships became more extensive and complex. In 1995 many were visible or existed under the bitumen. Most were removed in 1996.

The tracks are shown on various plans. Of great importance is the traverser track, which remains, to the west of the building. This provided a crucial functional link to other buildings and to tracks on both sides of the building. It was formerly located within the building in Bay 13 and was relocated very early in the history of the building to facilitate its operation.

Along the South side of the building were two sets of tracks and several associated turntables which demonstrated how items were moved from bay to bay and to buildings such as the wheel press shop (See later sections on machinery). Some turntables have been retained in the roadway but rails have been removed.

To the east, Innovation Plaza was formerly the site of the *extended steam hammer shop* and *spring shop*. Most sub-surface remains were removed from this area during construction works in 1996. The track parallel to the building, which linked to turntables at each end was also removed. This area has a history of industrial use and this should be interpreted in relation to the Locomotive Workshops and to the rest of the site.

To the north the rail lines are have been relaid with new rails and ballast. None of the turntables have survived in this area. New light fittings have been installed.

Finishes

The external faces of window frames and doors were painted and appear to be a light colour in early photographs. Otherwise external surfaces were unpainted

Internally the walls are painted and the first coat is a chalky, lime based finish, probably limewash, which is light in colour. The finishes to the iron have not been investigated. They are now painted in what appears to be “Silvafrost” or similar. Early photos show the internal iron and steel to be dark in colour and some of these finishes remain on various unpainted elements. The photos also show a crane picked out in two colours as were the timber doors with the ledges and braces painted dark. The simplicity and nature of finishes are an important contributor to the industrial character of the place.

4.3 STRUCTURAL ASSESSMENT

4.3.1 Inspection

Prior to the 1995 report a visual structural inspection was carried out by Jim Loke of the Structural Engineering Section of NSW Public Works, in the presence of Otto Cserhalmi, conservation architect. The inspection was made primarily from the ground except for inspecting the roof structure in the middle of Bay 1 from the crane platform. Further structural investigation was undertaken during the 1996 works and extensive repairs undertaken.

4.3.2 Observations

1. The building has a load-bearing brick facade, cast iron internal columns, roof trusses and purlins and sheet roofing. In some areas timber purlins have been added to secure the sheeting. Travelling gantry cranes are supported by fabricated plate web runway girders. The girders are supported internally on circular cast iron columns, at the end walls by columns stabilised by brackets fixed to the engaged wall piers and directly to the gable walls.

   The original building (Bays 1 to 4) is shown on the original drawings to be supported on timber pile groups of unspecified length in unspecified material. Later additions to Bay 5 to 16 (old Bay 4a, 5 to 15) appear to be supported on high level footings. The subsurface conditions at the site comprise fill overlying sand, overlying clay and overlying shale. The fill appeared to be uncontrolled, the sand loose to very loose, the clay stiff to very stiff and the shale extremely weathered.

2. Structural damage to the building was confined to Bays 1 to 4 and the brick annexes along the south facade, and was manifested mainly as brickwork cracking. This was most severe in the north-east and south-east corners of Bay 1. Bays 5-16 (old Bays 4a to 15) appear to have suffered no structural damage other than some light rusting of the roof purlins.

3. Detailed investigation found severe deterioration of the piled footing. It was underpinned during adaptation works and the cracked brickwork repaired. The work appears to have stabilised the deterioration.

4. The south-east corner of Bay 1 had cracking similar to the north-east corner but there was no lean. In addition the south face of the pier also showed cracking at the top

Figure 4.21: East wall, Bay, Row 15. Crack down the length of the east face of the north-east corner. The lintel at the left was a steel beam encased in concrete. Part of the encasement to the beam soffit had spalled away due to corrosion of the beam.The expansion product of the corrosion hadcracked and caused the brick wall to bulge out at the beam support. Source: OC+P 1996.

Figure 4.22: East wall, Bay, Row 15. Extensive repairs were undertaken in this area including underpinning and the rusting steel been was removed and the wall reconstructed to its former configuration. The crack down the length of the east face of the north-east corner was repaired. Source: Jean Rice 2002.

Figure 4.23: S-E corner, Bay 1, Row 1, east wall showing crack in centre of pilaster, now repaired. Source: OC+P 1996.

5. There was vertical cracking in most of the intermediate engaged piers along the east wall in Bay 1. The cracking commenced below the stone cornice where the embedded stormwater downpipes start. This was due to corrosion of the pipes. The downpipes were diverted to the exterior and brickwork stitched in 1996.

6 There was localised cracking adjacent to wall openings which might be due to settlement. Some cracking may be expansion cracks as the building does not have any expansion joints. These have been repaired.

7. There is some cracking in Bay 3 of the south wall adjacent to the gantry crane supports. The lateral displacement at the cracks suggest the cause might have been the dynamic effect/impact of the crane. This requires repair.

8. The coping courses on the south end gables of Bays 1 to 4 are split on the bed planes and the lower courses have tilted outwards.

   It may have been caused by corrosion of embedded metalwork. Steam from the steam drop hammers and the boilers in this area of the building might have caused the corrosion. This cracking of the gables is not evident in other areas.

9. Cracking is also evident in the brickwork in annexes attached to the south facade in Bays 1 to 4.

10. Two internal columns between Bays 1 and 2 had settled as indicated by the dip of the supported roof trusses. The settlement might have been due to local weakness in the soil and/or heavy dynamic loads from the work operations. The settlement appears to have stabilised.

11. There is light rusting of the cast iron roof purlins whilst the roof trusses are generally in good condition. Timber purlins were added later.

Figure 4.24: Row 5, east wall Bay 1. The arrow is pointing to a crack (now repaired) that ran from the top of the building to the top of the doorway. This may have been an expansion crack. Photo: OC+P 1996.

Figure 4.25: Deterioration associated with corroded downpipes embedded in the wall of one of the annexes. Photo: OC+P 1996.

Figure 4.26: Row 3, east face Bay 1, showing damp associated with blocked downpipes, now repaired. Source: OC+P 1996.

4.3.3 Structural Adequacy

1. The building as a whole appears to have stood the test of time well, including the structural frame and the roof, except for cracking of brickwork in Bays 1 to 4.

2. It is considered that the structural adequacy of Bays 4a to 15, as a whole including the structural frame and roof, are not in doubt in respect to gravity and wind loads.

3. Bays 1 to 4 are considered structurally adequate in the short term in respect to gravity and wind loads. The brickwork in the north-east corner has been stabilised, but that in the south-east corners of Bay 1 and the southern end gables in Bays 1 to 4 requires repair.

4. It is considered that the coping courses of the southern end gables in Bays 1 to 4 in their present condition are at risk of collapse in an earthquake.

5 The adequacy of the rest of the building to resist horizontal earthquake forces has not been assessed in detail but the brick gables and parapets are slender and unrestrained and it would be desirable to stabilise them for earthquake loads.

4.3.4 Recommendations

1. Subject to confirmation from a closer examination, the corrosion of the roof purlins is light and is not considered to affect the structural adequacy. The purlins may be left in their present condition.

2. Generally the cracked brickwork should be stitched using a lime mortar, to match existing. The east wall has already been repaired. Repairs to other walls have been documented.

3. Monitor the brickwork repaired at downpipes and monitor brickwork near any active embedded downpipes for cracking.

4. A closer examination of the southern end gables in Bays 1 to 4 has been carried and appropriate remedial work documented. It should proceed.

5. The building would not have been designed to resist earthquake loads, as there was no requirement to do so in those days, though many buildings did so by being overdesigned.

Figure 4.27: Example of how coping courses are split on the bed planes. Source: OC+P 1996.

Figure 4.28: Detail of split bed planes on coping. Source: OC+P 1996.

Figure 4.29: Bay 2 north.Typical crack requiring repair and monitoring. Photo: OC+P 1996.

The current earthquake code AS1170.4 requires new buildings to be designed to resist earthquake loads. But there are no requirements for existing buildings unless alterations are made to the building, which reduce its resistance to horizontal earthquake forces.

There are no statewide regulations in NSW relating to the need to upgrade existing buildings to resist earthquake forces. However, under the Local Government Act 1993, councils can order a building owner to repair or make structural alterations to a building if the building is or is likely to become a danger to the public.

It is now common practice for owners to strengthen, where required, buildings of high heritage significance, to improve their resistance to earthquake forces and reduce the risk to loss of life and injury to people, for example at the Honeysuckle Workshops at Newcastle. In view of the above, it is prudent to carry out an analysis to determine the capacity of the building to resist horizontal earthquake forces.

Figure 4.30: Deterioration of stonework caused by rusted steel inserts. Photo: OC+P 1996.

4.4 BUILDING EXTERIOR

This section describes elements of the building which are addressed in detail in the building fabric inventory.

The east wall was surveyed in detail in the inventory in 1995 and again in 2002. The results and recommendations and work carried out is summarised here. The facade is largely intact, considering the great number of changes that have occurred at this part of the site.

The north, south and west walls were not assessed in detail in 1995. The following assessment is based on an inspection from a knuckle-boom in May 2002 and the investigation carried out from ground level in 1998 (Facade Lifecycle Study). The unsafe elements recorded in 1998 have been removed, but only some of the recommended rectification works have been completed.

There are a large number of historically significant elements attached to the building's fabric. These attachments (fixed by screws, bolts and other – mainly corroded – inserts) could affect the integrity of the fabric so regular monitoring is required.

There are outstanding works that need to be addressed in order to keep the fabric of the building in good order. They can be grouped into three categories: structural elements; areas not directly threatened structurally but where repair is essential (e.g. to prevent water penetration); and aesthetic rectification.

Roof System

Due to PWD safety instructions operating in 1995, only limited access was then available to the roof system to Bay 1 and 2. It was evident however, that sections of the roof system were original and therefore are highly significant. These elements were as follows: cast iron gutters, some heavy gauge and large profiled corrugated iron roof sheeting (likely to be of wrought iron), heavy gauged louvre blades to the roof lantern. Also, a surprising survival was the roof lantern's end wall sheeting and detailing to Bay 2, with what appears to be early wrought corrugated iron together with parts of the original timber architrave trim work. This is shown on the original drawing.

The conclusion, when appraising the whole of the roof structure, together with the internal trusses and columns, is that the whole roof system works as one entity.- with ingenious cast iron gutters connecting to cast iron columns which act as downpipes, while the whole of the roof structure appears to have been constructed from wrought iron - with all truss members and all roof and lantern sheet members.

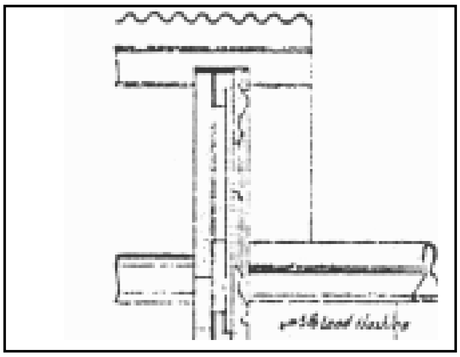


Figure 4.31: Roof section showing the end of the roof lantern with moulded timber detailing. Source: SRAO ELW5.

Figure 4.32: Detail of end of roof lantern showing corrigated sheeting and moulded timber detailing. These may have been removed in 1996. Photo: OC+P, 1995.

Though roof leaks are evident in parts of the complex, it is an outstanding system which has survived over a hundred years. The 1995 report recommended research to ensure the system be repaired so it continued to operate satisfactorily. It was later found difficult to repair and major elements were replaced though the historic fabric remains *in situ*. Refer to Section 4.5 Building Interior's Roof Truss for further information re roof system.

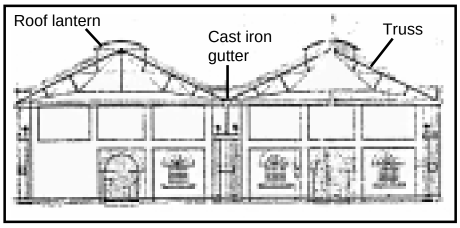


Figure 4.33: Section showing the roof system, Source: SRAO ELW3.

East Wall

The main conservation issues are as follows:

- North and South ends have been stabilised.
- Window recesses: these were originally a series of cast iron windows with intermediate "blind" windows. The recent aluminium window and door installation was removed in 1996. The works involved reinstatement of some cast iron windows and leaving some openings as doors.
- The eastern facade is now the public front to the complex. The main central doors in Row 7 were originally ledged and sheeted timber doors but had been replaced with intrusive metal doors. They were replaced with new ledged and sheeted timber doors.
- Hydraulic lines and flues, which service the working machinery in Bay 1, are mounted on the wall. Though some parts are understood, the function of other lines is not known. These were retained.
- Brickwork: major repair of the facade, was carried out while retaining the patina of age.
- New glazed doors of modern design were inserted to allow interpretation and to make new work distinguishable from old.

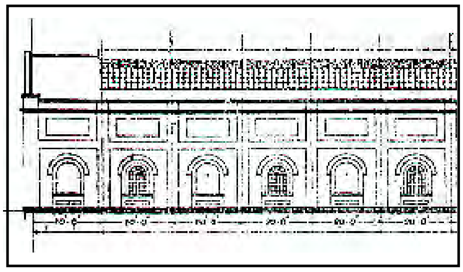


Figure 4.34: East wall elevation showing the original configuration with alternating blind panels and windows and brick detailing with arched heads to windows, panels over all divided by pilasters. The location of the original rooflights is shown on the roof. Source: SRAO ELW3.

Figure 4.35: The east wall of the Locomotive Workshops, Bay 1, Rows 1 to 15. Row 1 is at the left of the photo. The photo shows the many alterations to this wall. The wall was subsequently repaired and the original detail reinstated in most bays. Fire doors etc. were added in bays already altered.Source: OC+P 1996.

North Wall

The condition of this facade is good, considering its proximity to the main rail line and the large number of attached corroded steel elements. The major cracks that were recorded in 1998 are still present and during the latest inspection cracks were noticed that were not recorded earlier.

- It is strongly recommended that the cracked brickwork is repaired promptly and monitored on a more frequent basis than the other walls, due to the potential vibration damage from trains.

- Additional fixtures do not appear to have impacted adversely on the walls. However, regular inspections are recommended in order to monitor and prevent further damage.

- The extent of the brickwork requiring repointing proved to be larger than recorded earlier.

- The brickwork's decorative horizontal projections (120mm wide) were capped with cement weathering. This weathering has deteriorated significantly resulting in leached-out brick joints in the projecting courses. It is strongly recommended that the weathering is reinstated, possibly using other materials.

- It is recommended that replacement of the rusted ferrous capping of the stone coping course is undertaken around the roof plants' housings.

- The coping course's stones are in the same condition as they were during the 1998 investigation and all the joints need repointing. A detailed schedule of the repair works needs to be prepared

- Unless shown to be unsafe the damaged stones can be left in their present condition. The condition of the toggles needs further assessment.

- Rudimentary repair work has been done on the stone cornices. The stones are in reasonable condition and no major work is required unless it is to address their aesthetic value. The deteriorated cornice stones need to be regularly inspected as they are eroding more rapidly than the intact ones. All joints require repointing and cracks should be repaired.

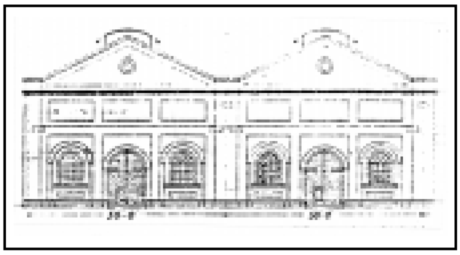


Figure 4.36: Elevation showing brickwork detailing to gable end walls and the arrangement of doors and windows. Source: SRAO ELW3.

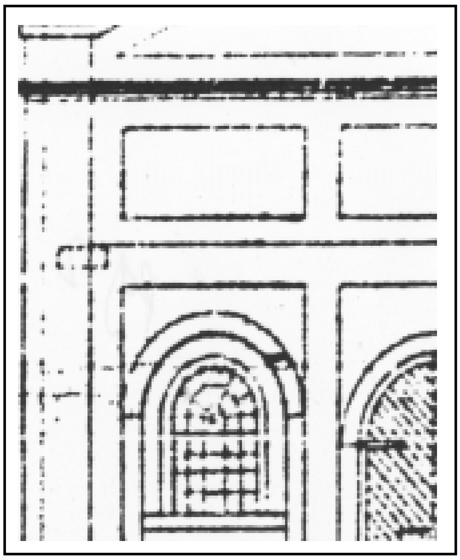


Fig4.37: Elevation detail showing brick panels and detailing around windows. Source: SRAO ELW18

Fig4.38: Bay 1 north, arch 3 shows extensive cracking longitudinally along the wall. These cracks require prompt repair. Photo: Istvan Czehmester 2002.

- The steel windows are in good condition following the repair works in 1996. One single glass pane (Bay 10) is broken.

- The original timber windows are, on the whole, in good condition. Suspected termite damage was found on the bottom rails of some of the windows. These rails need replacement. The corroded steel lintels require treatment.

- The large number of penetrations introduced into the wall including porcelain inserts for cabling are potential entry points for rain thus frequent monitoring is required.

- Where multiple insulators have been inserted (e.g. Bay10), steel lintels were not added for support. These areas require regular inspections for damage.

- There are some intrusive elements on the wall, such as the cable tray in Bay 1 and the pipe protruding through the brickwork in Bay 4 (see Fig) and they should be removed.

Figure 4.39: Bay 4, north wall. The facade has some intrusive elements such as this pipe which should be removed and the brickwork repaired. Photo: Istvan Czehmester 2002.

West Wall

- The of this facade is, on the whole, very good and requires only general maintenance. Minor repairs required have been documented and should proceed.

- The facade is largely original and highly significant and no alteration should be made to it.

- The highlight windows, added to the mezzanine area of Bay 16 (old Bay 15), have been preserved, as well as the large metal brackets of the former monorail, as both are important for historical interpretation.

South Wall

The main conservation issues on this wall are as follows:

- The cracking of the roof pediment, or gable, brickwork (a few brick courses below and parallel to the sandstone parapets). Refer to Section 4.3 re Structural Assessment.

- The sandstone deterioration of cornices and copings of both annexes and main walls.

- Generally similar comments apply as for the North wall except that on the south wall there are fewer attachments and insertions.

Figure 4.40: Looking west along the south elevation of the Locomotive Workshops during their adaptation to the Australian Technology Park in 1996. Half of Bay 11 (old Bay 10) is visible to the right of the photo. Photo: OC+P 1996.

4.5 BUILDING INTERIOR

The drawings on this page describe and name the various elements of the structure that are discussed in the following section.

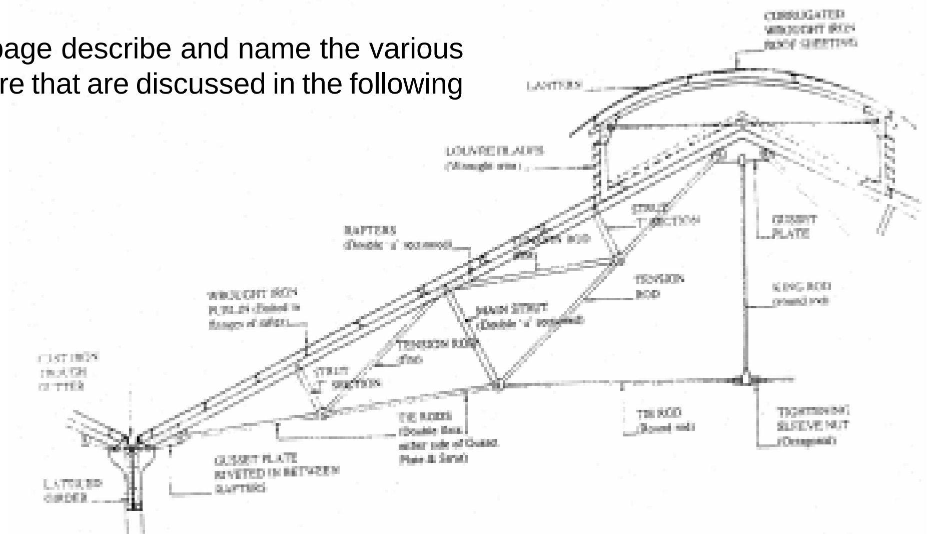


Figure 4.41: Sectional elevation A. Part elevation of principal truss. Source: OC+P

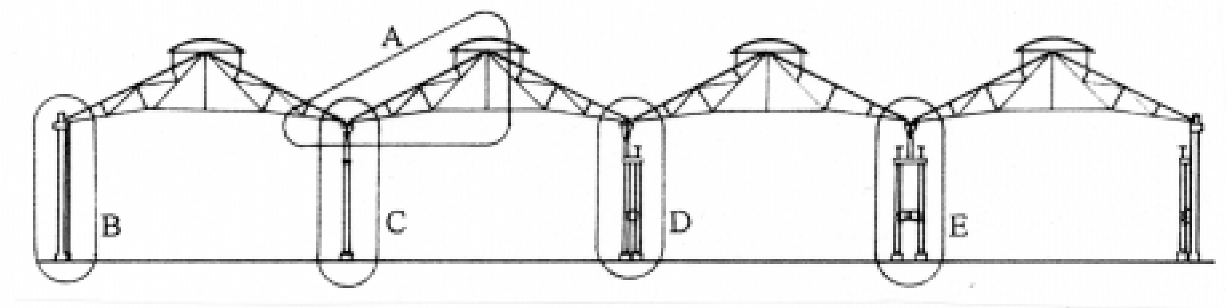


Figure 4.42: Sectional elevation Bays 1-4 showing the locations of the details above and below. Source: OC+P.

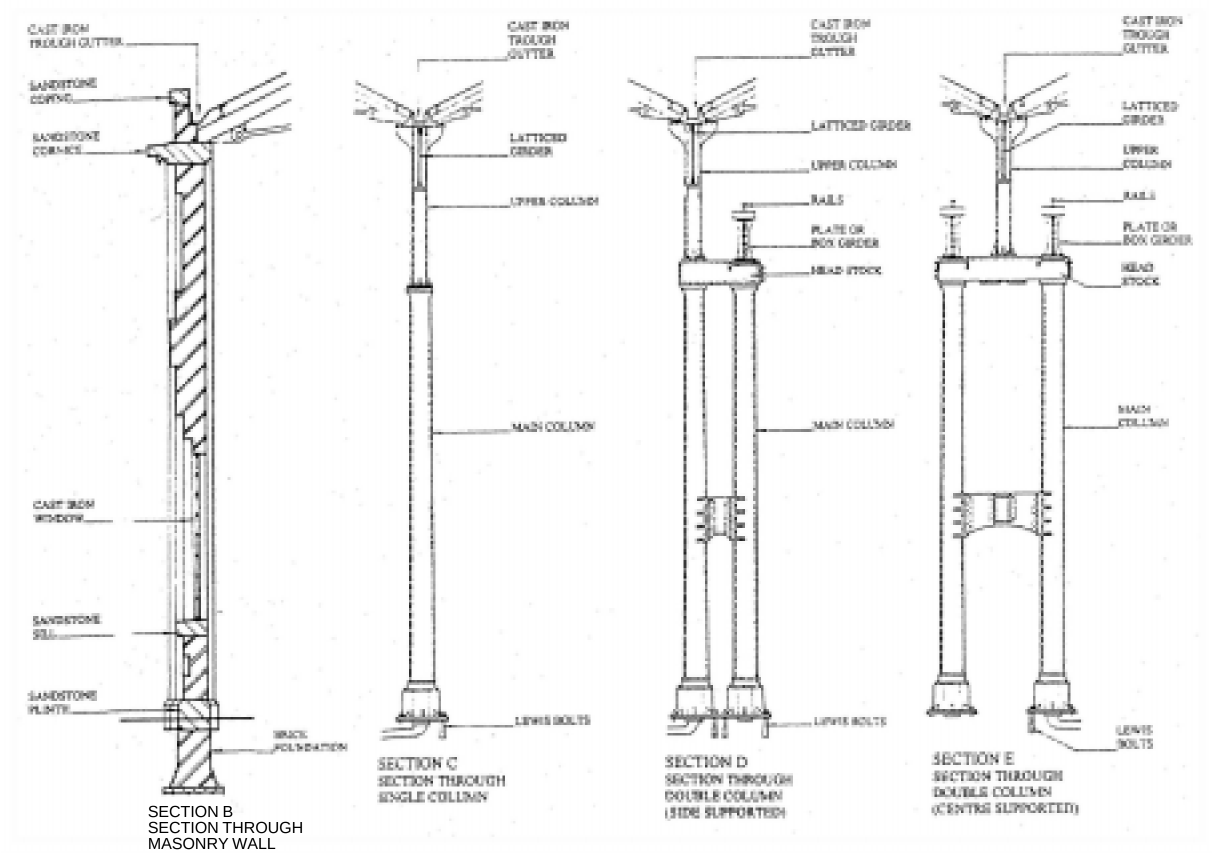


Figure 4.43: Cross sections of the various column and wall arrangements. Source: OC+P

Roof Truss System

The development of factories in the 19th century required large unobstructed floor spaces. Heavy timber trusses were supplanted by lighter metal ones. Early buildings relied on massive masonry internal and external walls, called "load bearing walls", to support the weight of the heavy roof systems. With the development of cast iron, the former were gradually replaced by a system of free standing cast iron pillars or columns (now load bearing).

The development of metal roof trusses in the 19th century saw greater use of wrought iron. Often compression members were cast iron and tension makers wrought iron. By the 1880's, wrought iron was the favoured material due to its ease of motility, allowing it to be readily turned into useful shapes such as angle irons, T irons, channel irons and 'Z' iron. A construction textbook from the 1880's well summarises this endeavour:

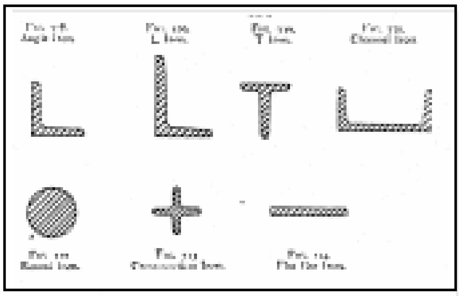


Figure 4.44: Wrought iron shapes. Source: Burrell

"*The ease with which wrought iron can be worked and its adaptability to all situations and purposes are causing it to entirely supplant the former (cast iron) in roof construction*." (Burrell, page 201).

The abovementioned simple shapes (angles, T sections, etc.) were united to wrought iron plates by being riveted or bolted. This allowed for great strength without the excessive weight of the former cast iron or timber systems. Thus, lightweight trusses and girders were created.

At Eveleigh the truss system appears to be totally of wrought iron and largely conforms to the recommended English textbook formula (as shown below).

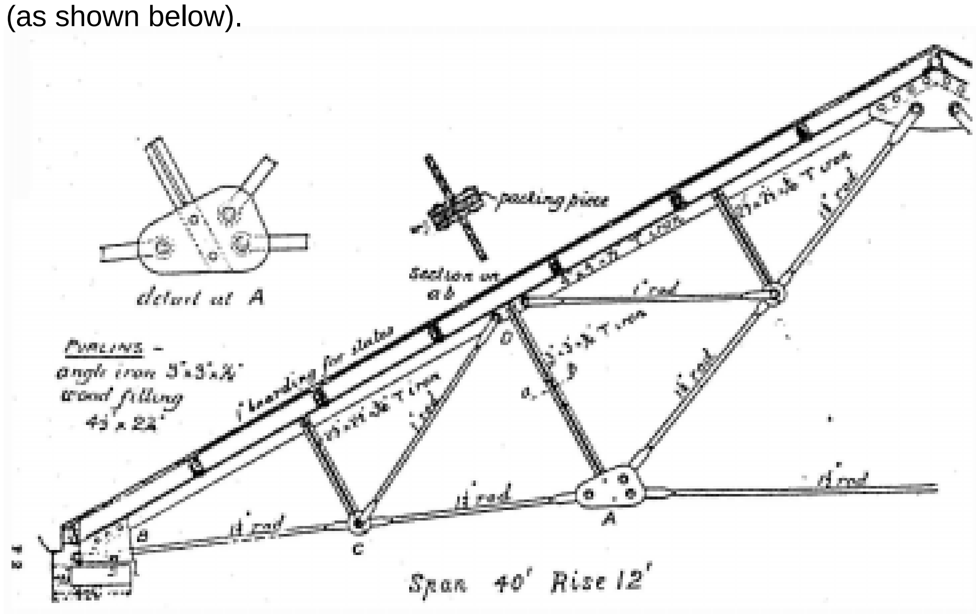


Figure 4.45: Text book truss. Source: Burrell.

Notably, the differences are minor, these being the span being much larger at 60 feet in lieu of 40 feet. The fact that the English example is designed for the heavier weight of slatework accounts for part of the difference. The central vertical tie or King Rod is also an added tensioning member at Eveleigh.

The whole truss system is described in Burrell as a “trussed rafter roof”. They saw the system essentially as rafters supported at intermediate points with struts and joined by rods (creating a triangulated truss). The system was quite ingenious wrought iron sections flattened at ends, drilled out (to take bolts or rivets), consequently readily lifted into place, bolted together and by use of a central tightening threaded sleeve, or shackle, the whole truss was drawn together and stiffened.

The tie rods at Eveleigh closely follow the text book recommendation of round rods with ends forged out and drilled out to form eyelets. Through these, bolts or rivets are passed through and connected to struts, rafters or gusset plates.

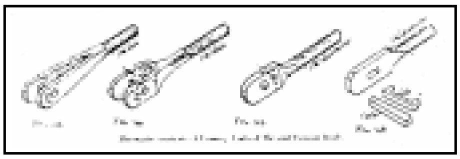


Figure 4.46: Tie rods. Source: Burrell.

The strut system is also of interest. In earlier 19th century metal trusses, these were cast iron members. Later, due to weight consideration, wrought iron was used. Initially it was used as a built-up section consisting of two flat bars with cast iron “distance pieces”, as shown opposite.

Gradually, it was realised that a flat bar could not resist the compression stresses as well and the ties became buckled (W.B. McKay, page 130).

At Eveleigh, this was realised and “u” shaped members replaced the flat bars.

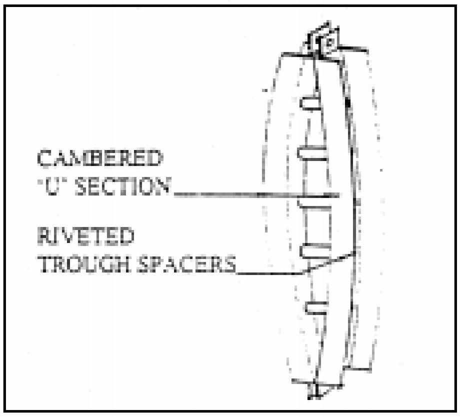


Figure 4.47: Eveleigh Strut system 1884. Source: OC+P

Summary: The roof truss system at Eveleigh in technological terms was not only up to date with general standards current in Great Britain at the time, but in certain aspects, as evidenced by the strut design, was very advanced for the times. Consequently, the truss system is of the highest significance.

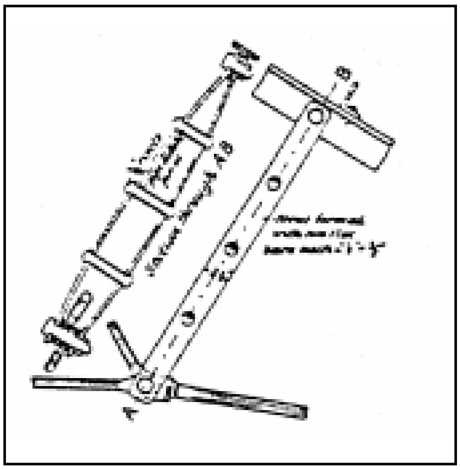


Figure 4.48: Text book strut system. Source: Burrell

Columns

As described above under Roof Trusses, the development of 19th century industrial techniques saw the increased use of cast iron. The cast iron columns at Eveleigh were hollow on the inside (see sketch opposite). The hollow columns allowed for use as internal downpipes.

The casting technique and the 19th century aesthetic of decorating even utilitarian industrial buildings allowed for quite ornate classically inspired columns.

The columns at Eveleigh follow this Victorian trend, with each column incorporating classical entasis and mouldings at their capitals and bases. However, the columns are of slender proportions, showing the need for greater height in industrial buildings.

The need for overhead cranes resulted in a system of columns whereby the standard single column could be combined with others to support crane rail girders. The sophistication of this is apparent at Eveleigh, as shown in section, with single rail and double rail systems.

The columns were connected to the base with “lewis” or “rag bolts” set in dovetailed shaped joints filled with molten lead. These are evident on the original Eveleigh drawings.

The height of columns was increased by smaller “upper columns” bolted to either the lower columns (type A), or bolted to the intermediate “head-stock” member.

In between the upper columns, latticed girder members are inserted to stiffen the whole structure. Similarly, girders were installed to take weight of the crane railway, however these were boxed girders. Again this use shows the development of wrought iron technology by the latter part of the 19th century. This allowed relatively simple, light-weight members to be riveted together, providing great strength and produced more economically than large rolled girders.

The columns were also originally designed to have large cast iron brackets bolted to them to take a series of steam, etc. supply lines from boiler rooms to the factory floor machinery. This original principal of using the columns to support service lines was followed by generations of engineers at Eveleigh. Further research is required to obtain a clearer understanding of the significance of all the layers of supply and exhaust lines. This research will also be able to assist the formation of policy guidelines for the future use of columns, ie, to determine their load bearing capacity.

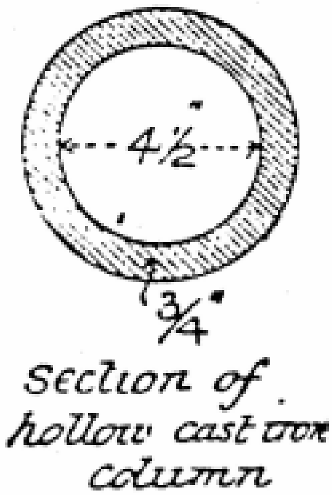


FIG. 268.

Figure 4.49: Text book section of hollow cast iron column. Source: Burrell.

Internal Walls

There are few internal walls. That between Bays 5 & 6 (old Bays 4a & 5) was originally an external wall and those between Bays 14 & 15, 15 & 16 (old Bays 13 & 14, 14 & 15) re original internal walls. Spaces are subdivided generally by the column grid. The perimeter walls are load bearing brickwork (discussed in Section 4.2). The walls in Bays 1-4 are shown on the original drawings to be built onto a heavy timber platform which is then supported on a closely spaced system of timber piles. Settlement of the north and south ends of the Eastern Wall (Bay 1) and of several of the cast iron internal columns, was the result of deterioration of the underground piling system.

The condition of the walls is generally good, other than upper sections of the south wall (pedimented sections). Contamination of the walls by ground salts, air borne pollutants as well as various chemical/solutions from the long industrial processes at Eveleigh, should be well understood before any resurfacing of the brick and stone work is proposed.

Windows

The original windows at Eveleigh are of cast iron, with curved heads and multi-paned. The centre section, consisting of nine panes, could be opened, operating from a central pivot hinge. The castings incorporated traditional ‘astragal’ cross sections, which follows from earlier timber traditions.

The existing surviving cast iron windows are highly significant. Existing windows have been conserved and replacement parts and whole frames were cast on site at Wrought Artworks.

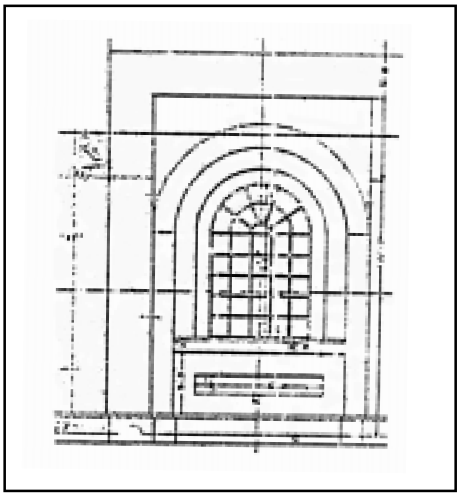


Figure 4.50: Eveleigh cast iron window, 1884. SRAO ELW3.

Doors

The main doors at Eveleigh are typical of the period, being ledged and braced timber doors. The doors are large, needing their own wicket doors set within the main swinging leaf. They exhibit a high level of joinery skill in their construction. In 1995 it was observes that there was physical damage to most timbers but many were structurally sound. There was evidence of termite damage to timber jambs in some locations. Some of these doors have since been repaired and others replaced with new doors detailed to match. Repairs are still needed to the southern doors in Bay 1.

The ironmongery of the doors was sophisticated, ranging from the wide strap hinges to the heavy cast iron hangers built into the masonry walls. The doors were fixed by a number of top and bottom cast iron draw bolts and locked by a traditional ‘Carpenters’ style rim lock.

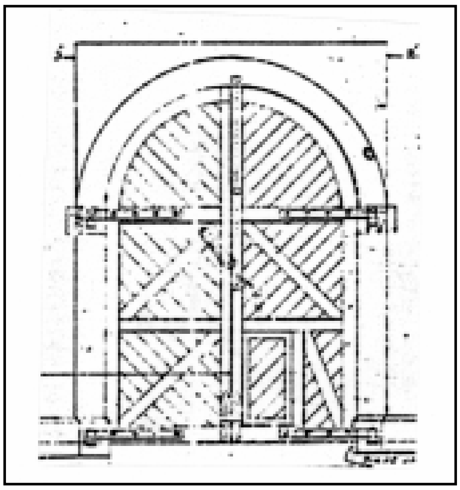


Figure 4.51: Eveleigh Locomotive Workshop’s main doors. Source:SRAO ELW17.

The existing surviving doors are highly significant and have been conserved as far as possible or replicated where not. Fire egress doors are designed as special wicket doors in each leaf.

Other Items and Features

Other items noted are fascias, barges, architrave trim at the end of roof lanterns. Many of these were lost in the 1996 works. Some social history items such as significant graffiti have been conserved including a lottery ticket mural not yet on display but stored on site. These items are of considerable importance but in the initial adaptive reuse many were removed. Remaining items should be conserved.

Floors and Sub-Floor Spaces

In 1995 the existing floors at Eveleigh included a range of industrial finishes, from concrete and bitumen to bare earth and contribute to the character of the place. The floor finishes are often over earlier finishes, concealing a range of old rail lines, sumps, pits and drains. Care was exercised in dealing with these so that the full historical interpretation of Eveleigh was not lost. Refer to the archaeological section for further comments. Floors remain as was in Bays 1 & 2 but have been topped with concrete elsewhere. The slab was designed as reversible and is separated from the substrate with plastic. The earth floored area in Bays 1& 2 contains high levels of hazardous materials. It is intended to remove the top layer of this, encapsulate the remainder and to top it with clean material.

The building's footings are described in Section 4.2. The underground drainage system is integral with the cast iron column and cast iron roof gutter systems. Full details of the nature of the underground drainage system are not known but it has been bypassed with the installation of a new plastic system in 1996. The new pipes run through the structure at high level to the outer walls of the building to minimise disturbance to the underground features within the building.

4.6 THE MACHINERY

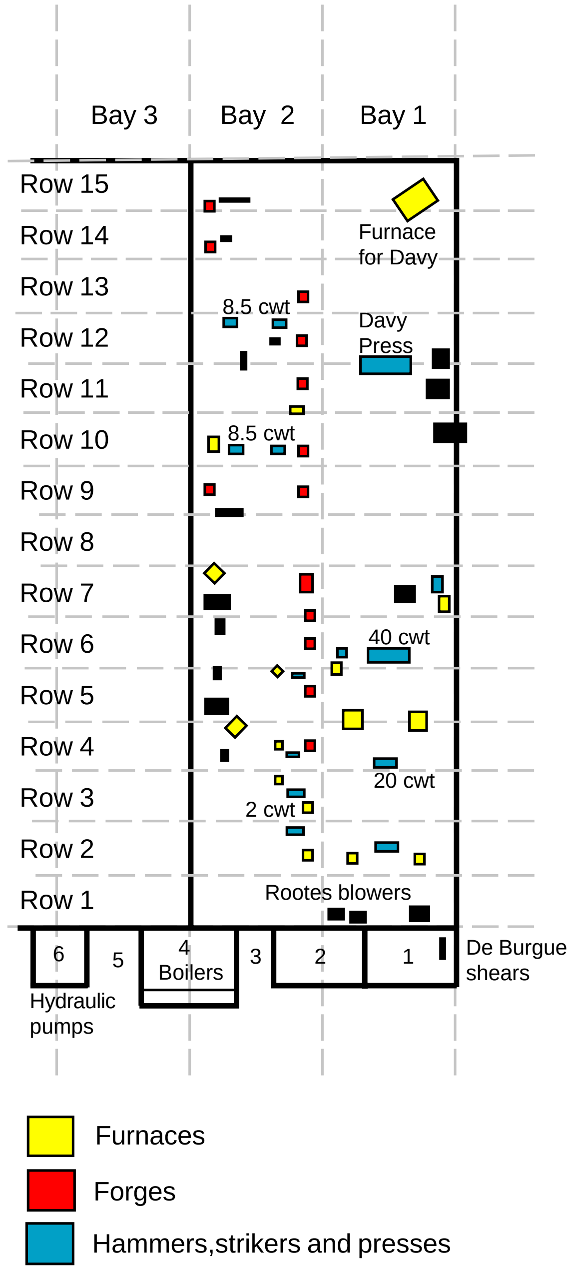
4.6.1 In Situ Plant and Machinery within the Workshops

In 1995 the machinery and equipment in Bays 1-4A of the Locomotive Workshops consisted of:

1. Large equipment and plant in its original location,
2. Smaller ancillary pieces associated with this large in situ equipment, predominantly in its original condition and position
3. Equipment moved to Bays 1-4A from other locations within Eveleigh Railway Workshops,
4. Equipment moved to Bays 1-4a by the SRA from this site and from other locations under SRA control, and
5. Equipment belonging to Mr Guido Gouvernor, the resident blacksmith at the workshops
6. The only remaining equipment and plant in other sections of the workshops is the Tangye wheel press in Bay 10 (old Bay 9) and the overhead cranes and wall cranes.

This section of the report deals only with the *in situ* plant and equipment in the workshops. Other reports have been prepared addressing, in detail, the conservation management of all relocated and introduced items of machinery and plant. Some moveable items are considered in this report where they are an integral part of assemblages related to large items.

Most of the equipment from other sites was removed during adaptive reuse in 1996 and all remaining items moved into Bays 1 & 2. The detailed reports should be referred to. In 2002 some of the machinery stored in Bays 1 & 2 was relocated to Bay 10N (old Bay 9) as part of a display and to some other locations in the building. This was under the guidance of a machinery conservator.



Plan 4.3: Diagram showing approximate machinery locations in Bays 1 & 2. Source:OC+P 2002

4.6.2 Assemblages, Collections, Systems: Complexes and Precincts

Heritage items do not exist as neatly defined entities. Usually an industrial item, especially one associated with the railway, exists as a part of a large and complex group of associated items. These groups of associated items can be defined as assemblages, collections, systems, complexes and precincts. The term assemblages, collections and systems are usually applied to machinery and plant. The term complex usually to an industrial complex which is a combination of machinery, plant and buildings while a precinct usually applies to a group of buildings in a single location.

An Assemblage

An assemblage may be regarded as a relic or structure including all the artefacts, tools and items normally associated with it when it was operating. In the case of a machine it would include the spanners and wrenches used to tighten nuts, the tools needed to adjust gears or belts, the safety screens which prevent contact with moving parts and, if applicable, samples of the completed or partially completed work. It would also include signs, pipework and associated services.

A Collection

A collection is usually a number of relics or structures which belong to a group because they perform the same function or produce the same finished product. In many cases it is inappropriate to keep a single representative example of a collection of machinery in that the collection itself indicates the way in which a workshop operated.

Systems

A system is more than a collection of artefacts, rather it is an operational group of related relics or structures which cannot function effectively if any one is removed.

A Precinct

A precinct normally encompasses a geographic area, which contains a number of functionally related items. A precinct may include elements of a service industry, possibly, as well as elements of production and manufacturing industries.

The majority of items within the workshops belong to systems and assemblages. There are the collections of the Rootes blowers and the steam hammers but they belong to, and are treated as an integral part of the steam system. The huge collection of forging tools are regarded, along with the anvils and furnaces, as being a part of the assemblages associated with the hammers. There are items such as the sheet metal rollers, sheet metal furnaces and the shears which, because of their present condition are classified as individual relics. All the *in situ* items extant in the workshop were part of the workshops complex and each one is significant in interpreting the place.

The following sub-sections consider the hydraulic and steam systems, and then various assemblages. The consideration of "systems" overlaps with the services which are not considered separately.

Figure 4.52: Racks of tools adjacent to forges in Bay 2 north. Photo by OC+P 1998.

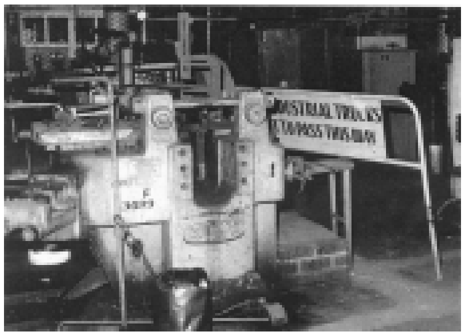


Figure 4.53: Bay 2 south. The covmac horizontal forging machine was used to produce track springs and heated steel rods. Photo by D. Godden 1985.

Figure 4.54: When machinery was stored in Bays 1-4 it was placed adjacent to *in situ* machinery making it impossible to interpret. Source: David Sheedy.

4.6.2 Systems in the Workshops - Hydraulic Power

The hydraulic system in the workshop consists of one steam hydraulic pump, one electric hydraulic pump, two hydraulic accumulators, a series of high pressure hydraulic lines which run along the east facade and the south facade and then internally to a number of machines, a low pressure return pipe and a cast iron reservoir and six items of hydraulic machinery in Bay 1 south and Bay 4 north. High pressure water is generated by the pumps and the pulsing produced by the pistons is removed by the hydraulic accumulators which also provide an artificial head to the water before it is conveyed to the hydraulic machines through 50mm ID high pressure pipes.

Figure 4.55: Annex 6 - the hydraulic pumphouse. On the left is the hydraulic power accumulator. Source: Jean Rice 2002

The Hydraulic Pumps

The two pumps are located in the brick annex abutting Bay 4 south (Annex 6). The steam hydraulic pressure pump by Fielding & Platt, Gloucester, England, operates on the Tweddles system. The two cylinder horizontal steam engine is integrated with a two cylinder high pressure pump manufactured in the late nineteenth century. The two reciprocating pump cylinders are double acting and are driven directly by steam cylinders with which they each share a common piston shaft. The pump cylinders are mounted behind and in line with each steam cylinder. The wishbone con rods from the two metre diameter flywheel are joined to each cylinder/pump piston at the crosshead. The speed is regulated by a ball type governor driven from the flywheel crankshaft. The machine appears to be in very good condition and an inspection of the steam cylinders in 1993 indicated that they had some superficial rust only.

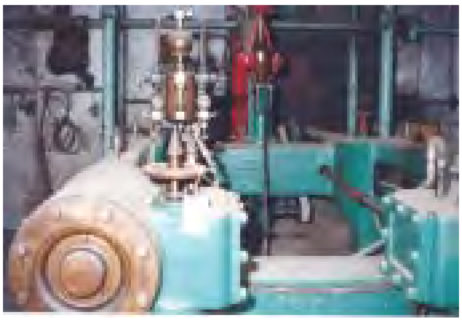


Figure 4.56 (top) & 4.57 (bottom): Interior view of the pumphouse showing the hydraulic pump. Photo: D.Godden 1995.

The electrically driven hydraulic pressure pump by Hat, Horn, Davey & Co., of Leeds, England, is powered by an electric motor by Hugh J. Scott & Co., Voltworks, Belfast. The 100 horsepower motor drives the open shaft and con rod, vertical, triplex, single acting pressure pump via a large reduction gear. Both pump and motor are mounted on a single cast iron bed which has been modified to suit the motor.

The pump and motor both appear to be in excellent condition and were both operating as late as 1988. Other equipment within the Hydraulic Pumphouse includes a workbench, cupboard, a series of tools and spare parts for both sets of pumps. All of the equipment within the room is related to the pumps and the operation of the hydraulic equipment. A full inventory of all equipment, tools and materials located within the Hydraulic Pumphouse is available.

The Reservoir

The reservoir is a three piece cast iron unit mounted on a timber platform supported by columns at the north end of the annex. The reservoir is fitted with a volume indicator and receives water from the low pressure return pipe and supplies water to the pumps again through a low pressure 4 inch dia. pipe.

Figure 4.58: The reservior. Source: Jean Rice 2002

Hydraulic Power Accumulators

Immediately west of the annex there are two hydraulic accumulators with valves and safety override equipment mounted on heavy vertical guideframes. The accumulators are really large boiler sections filled with scrap iron and/or sandstone. Both appear to be in fair condition with some rust evident on the shafts. It would appear that both could be made operational by cleaning or perhaps machining the shafts.

The Hydraulic Machinery

The hydraulic machinery, which is driven via the lines and the accumulators, consists of two Ryerson 72 inch spring forming machines, a hydraulic spring buckling press by Fielding & Platt, a second spring buckling press by Craven Bros., a hydraulic spring stripper by Craven Bros. and two small general purpose hydraulic presses.

The two hydraulic presses are located in Bay 1 south. They are both vertical acting single lever operation presses connected by standard valving to the hydraulic lines. The press closest to the northeast corner of Bay 1 south is a standard railway manufactured hydraulic press, while the other which is on the opposite side of the bay is a ram press by Tangy Bros. of Birmingham, England. Both exhibit the typical massive cast iron structure common to early 20th century hydraulic equipment.

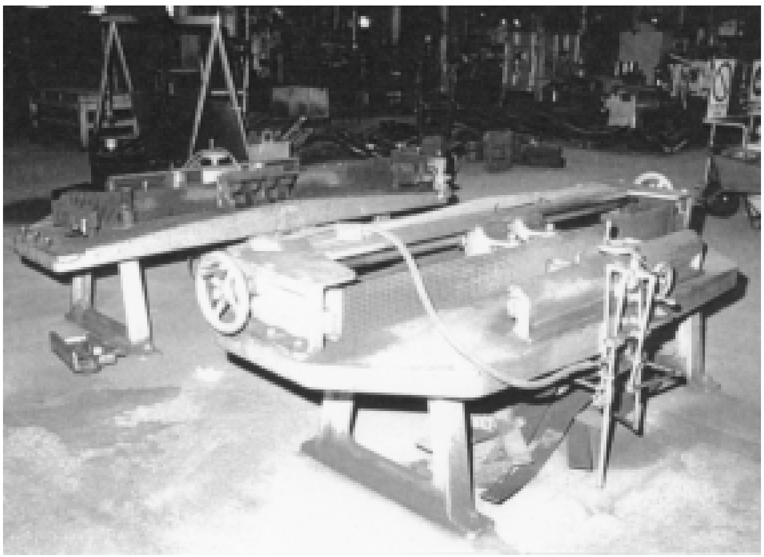


Figure 4.59: Bay 4 North. The Ryerson spring formers. Photo by D. Godden 1985.

The Ryerson spring forming machines consist of a table top, a long wide section of horizontally mounted flat chain mesh against which a curved ram can be forced by hydraulic pressure. When the press was being operated a straight red hot spring leaf was placed between the ram and the spring and the spring is forced to take the shape of the dye.

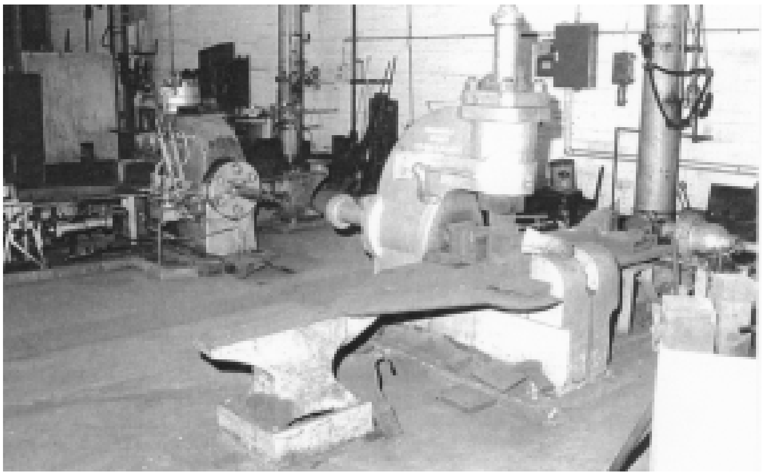


Figure 4.60: Bay 4 North. The Fielding & Platt hydraulic spring buckling press was used to assemble leaf springs. Photo by D. Godden 1985.

The hydraulic spring buckling press by Fielding & Platt and the hydraulic spring stripper by Craven Bros. were both used for the assembling and dismantling of leaf spring units. Again all of these machines evidence the massive cast iron construction which was common before the advent of rapid, deep oxy acetylene welding techniques. The Craven spring stripping press is the sturdiest of all the hydraulic machines and the massive cast iron frame held loco spring units during dismantling.

The reservoir, lines and hydraulic machinery all appear to be in good condition. However, it is not known what actions were taken by the SRA when the equipment was mothballed. A detailed inspection should be undertaken.

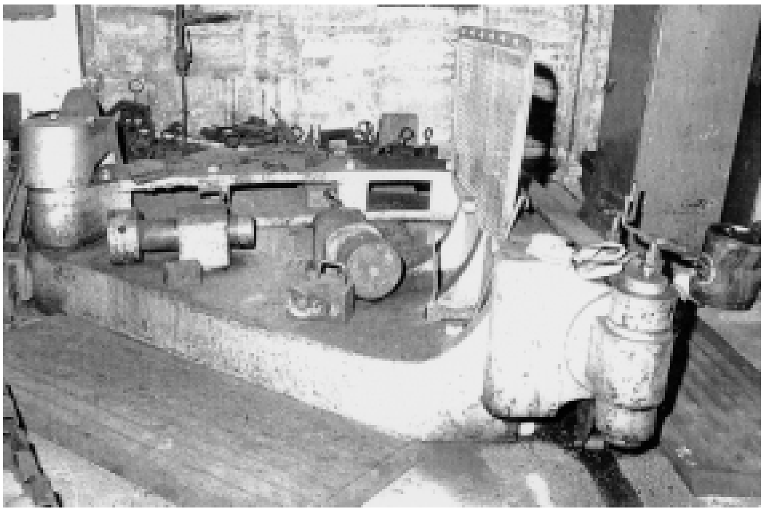


Figure 4.61: Bay 4 North. The Craven Bros hydraulic spring stripper was used to dismantle leaf spring for repair. Photo by D. Godden 1985.

4.6.3 Systems in the Workshops - Steam Power

The steam power system consists of four 36 class locomotive boilers, oil-fired when last used, located in the annex abutting the south wall of Bay 2. A series of steam lines which carry steam to the machines and equipment in Bay 1 north, Bay 1 south, and Bay 2 north, the exhaust vents from the machines served by the steam lines as well as the machines themselves which include the 40 hundredweight (cwt) arch steam hammer, the 10 cwt steam hammer, the 4 units of 8½ cwt hammers, and 3 Rootes blowers.

High pressure steam was generated in the boilers and sent via the steam lines and a series of valves to the various machines which were powered by the steam. When the steam had done its work and passed through the machines it was not returned to the system via condenser but was rather exhausted to the atmosphere.

The C36 Class Steam Boilers

The four 36 class steam boilers which are located in the annex at the south end of Bay 2 were possibly built at the Eveleigh workshops. This fact is uncertain although ten C36 class boilers were built here between 1924 and 1927. It is believed that these boilers were installed in this location in the late 1920s. At the time of installation the boilerhouse was modified to accept these boilers which were larger than the four M class boilers they replaced.

Figure 4.62: The four boilers. Source: Jean Rice 2002.

The boilers are distinguished by their 4m high steel stacks which rise above the skillion addition to the boilerhouse and by their massive steel locomotive frontplates. The boilers were originally fired from the rear by coal fed automatically to the grates. Later they were modified to be fired by force-fed oil.

The condition of the boilers is unknown although three were in operation at the time the workshops closed in 1988. Recommendations at that time were made to the SRA that the boilers were to be blown down and limed to prevent corrosion taking place. It is unknown whether this procedure was carried out. Before the boilers can be recommissioned they would have to pass inspection and because of their age would probably only be allowed to produce steam at a relatively low pressure. The boilers are located in a pit which at present fills up with water after rain due to blocked drains. Urgent action is required to remedy this problem.

The Steam Lines

The steam lines are all 6in. high pressure seamless or welded seam steel. They are characterised by the lagging which is held in place by steel sheet and by the expansion loops which occur at intervals generally in the centre of straight runs of pipe. Because of the danger to staff steam lines have traditionally be run at high level throughout workshops, descending vertically to the machines which they power. An exhaust vent, usually in the form of an 8in. pipe now runs from each of the items of machinery generally straight to a vent in the roof. In some cases the exhaust vents have bell-mouths on them to allow the easy dissipation of the steam and to cut down on the noise of the blowoffs.

The steam lines appear to be in fair condition. Assessing operational ability will need to be done by a bore inspector or similar expert.

The 40cwt Steam Hammer

This massive arch steam hammer has a single vertical cylinder with twin vertical guide rails for the hammer cast into the main frame. The arch frame is 2m wide at its base and the hammer is in excess of 4m high. It is the largest hammer at present in the workshops and is probably the largest hammer in existence in workshops anywhere in NSW.

Figure 4.63: The 40cwt Steam Hammer. Photo: D.Godden 1995.

In its final days the hammer was designated as a general purpose tool but it is possible that it was designed to perform a specific task when manufactured. The hammer is operated by a single lever which determines the amount of steam admitted to the cylinder. This determines not only the strength of blow but the speed at which the blows are issued.

The hammer bears no makers name or crest and it is believed that it was manufactured in the Railway workshops possibly as early as 1887.

The hammer is part of a system and must also be regarded not as a single item but as an assemblage. There are a series of tools such as tongs, fullers, swages and anvils which are all task specific which belong to the hammer. The assemblage in its entirety, including the crane which serves it as well as the remnant monorail, should be regarded as a single unit.

The condition of the hammer, like most of the steam equipment, is unknown. However, it is believed that besides some rust that may have settled in the cylinder it should be in almost operable condition.

The 20cwt Steam Hammer

The 20cwt steam hammer was manufactured by Davis Primrose Engineers, Leeds, England, possibly prior to the First World War. The hammer was made specifically for the NSW Government and on the shoulder of the main frame the insignia NSWG is cast into the iron. There are several other pieces of equipment throughout the workshops that have the same insignia, which indicates that the NSW Government specifically ordered the machine from the manufacturers.


Figure 4.64: The 20cwt Steam Hammer. Photo: Don Godden 1985.

This hammer has a single frame, it is bolted to a brick and concrete plinth, it stands in excess of 3½m high and has a stroke of almost 1m.

As with the arch hammer, the hammer is not only a part of the system but is also part of an assemblage with all tools for its operation as well as the tongs, fullers, swages, and anvils which were part of its operating environment are still extant. The whole assemblage must be regarded as an integral unit and all of these elements must be conserved with the machine.

This machine appears to be in good to excellent condition and the cylinder has been opened and any excess moisture dried out. This machine could be returned to operation with steam although with some modification could be used with a supply of compressed air.

The 8½ Cwt Hammers

The four 8½ cwt Davis and Primrose steam hammers are located in Bay 2 north. The machines were purpose made for the NSW Government and bear the NSWG insignia on the shoulder of the frame. They are general purpose machines and like the other hammers are fully equipped with their anvils, fullers, swages and dies. The date of manufacture is unknown but it would appear that they were installed prior to the First World War.

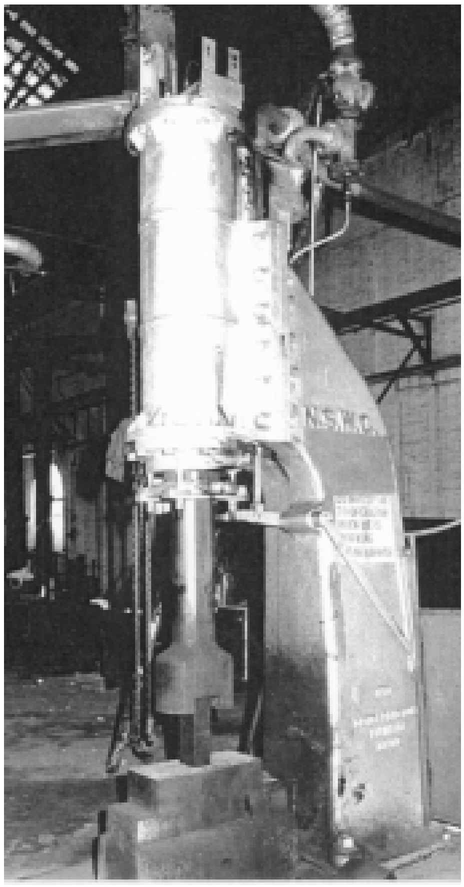


Figure 4.65 : Bay 2 north. The 8.5 Cwt Steam Hammer is one of a collection of four that date from the 19th century. Photo by D. Godden 1985.

Operation is by a single lever that controls the admission of steam to the cylinder and controls both the stroke and speed of blows.

The hammers have recently had their head opened and any condensed moisture dried out. It is believed that they are in excellent condition and could be returned to operation providing a source of steam is available. Again, with some modification, these units could be run on compressed air. It should be noted that similar machines are at present in the blacksmith shop of the carriage workshops on the north side of the tracks. These hammers (in the Carriage Shops) were made to be operated on compressed air rather than steam (as in the Locomotive Shop).

The Rootes Blowers

The three Rootes blowers on the south wall of Bay 1 south produce large quantities of low pressure air for the forges which were located throughout Bays 1-4. The air was circulated in underground pipes. The blowers were manufactured by Thwaites Bros. of Bradford, Yorkshire, in 1910. They were powered by the boilers and when the workshops were operating were running for the whole shift. Each machine is powered by a single piston which drives two conrods which in turn drive two opposing intermeshing gears which act in a rotary motion to push low pressure air through the system.

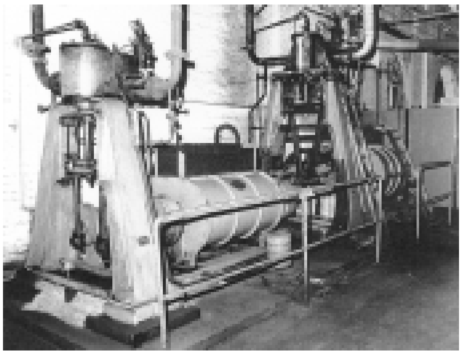


Figure 4.67: The Rootes Blowers by Bradford were used to supply high volume low pressure air to the furnaces. Photo: Don Godden, 1985.

Again these pieces appear to be in excellent condition. The equipment needed to maintain them is stored in part at the rear of the machines.

The Davy Press

The Davy press is located in Bay 1 north and is the most impressive machine in the workshops complex. It was a hydraulic machine powered by steam by the easternmost boiler in Annex 4 which was dedicated to the Davy press. The press stands almost 5m high and 3m across and is the largest steam press in Australia. Its operation involved a number of men under the control of a press foreman or supervisor. Ancillary equipment for the operation of the Davy includes two steam reservoirs, a steam intensifier and a hydraulic unit. As well there are a series of massive balanced tongs, work in partially completed form and a large number of dies, anvils, fullers and swages which were used to produce a variety of forgings.

Figure 4.68: Furnace associated with the Davy Press. The billet to be forged in the Davy Press were placed in furnace with balancing tongs and left to heat, often overnight. Source: D. Godden 1995.

The oil-fired furnace for the Davy press is located at the northeast corner of Bay 1 north. The material to be forged was brought to the Davy by the overhead crane.

It is essential to regard the Davy and all of its associated equipment as an assemblage rather than a single item. All of the equipment and work in progress should be kept with the Davy although it may be stored against the wall in a vertical or horizontal configuration rather than lying in a random fashion on the floor as at present.

The southernmost steam reservoirs for the Davy press are now located in an annex constructed on the eastern side of Bay 1 north. It is believed that this annex may have been constructed for a different set of reservoirs and this has now been replaced with a modern glass enclosure. The steam reservoir now consists of two short, large diameter horizontal pressure vessels located on a concrete plinth and supported by a universal section steel frame.

The condition of the Davy press and the steam intensifiersand steam reservoirs is unknown. It is believed that no effort has been made to service these machines since the closure in 1988. Unlike much of the other equipment within the workshops the Davy press required trained and skilled tradesmen to set up and operate it. No documentation exists today which will allow the Davy to be brought back to operation. However it is believed that some previous operators still possess that knowledge. The other ancillary equipment such as the balanced tongs, the overhead crane and fullers, swages and dies and punches, still appear to be in very good condition. The superficial rust which has formed on these has had phosphoric acid based rust converters sprayed on them recently and to check further corrosion.

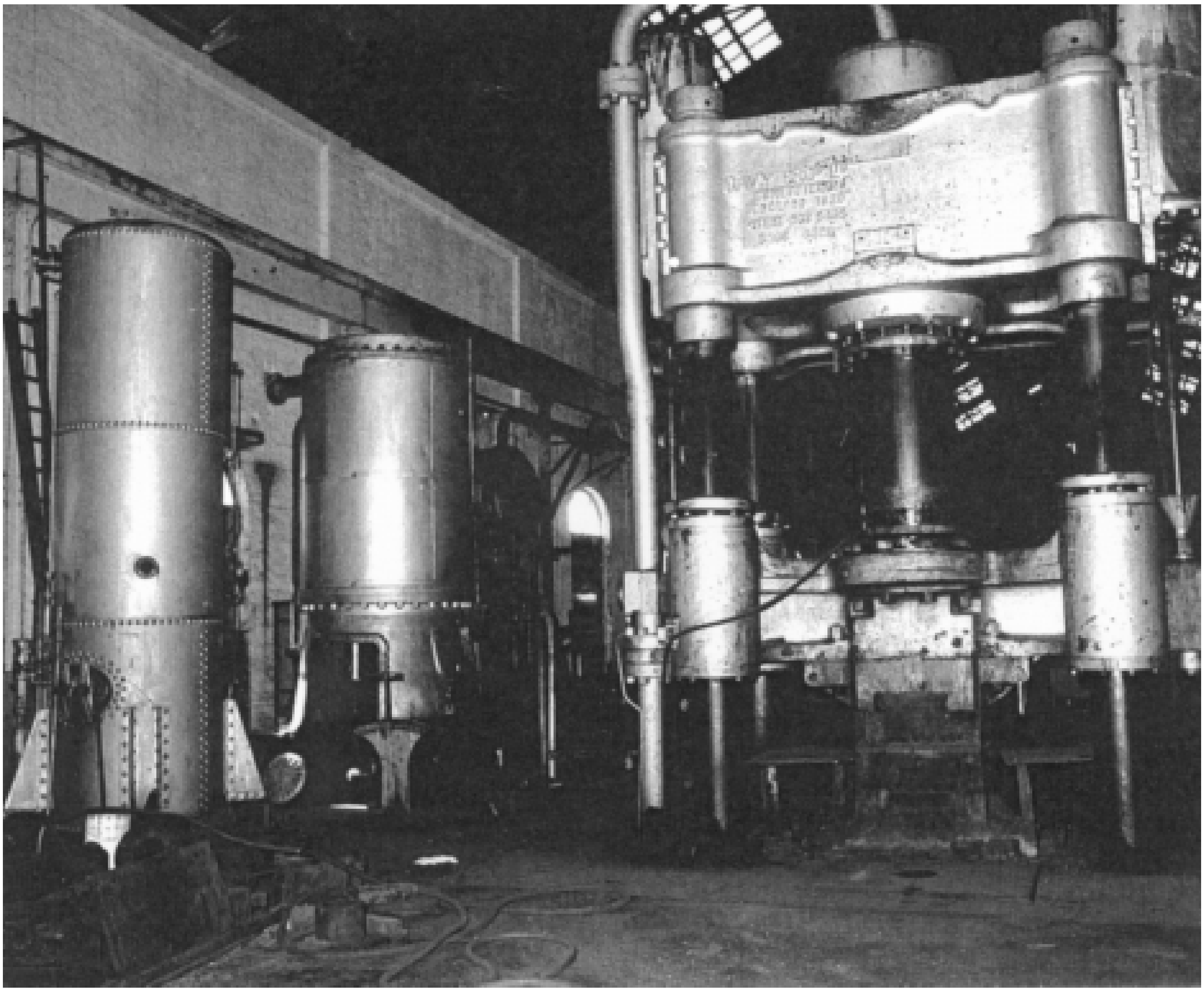


Figure 4.69: Bay 1 north. The massive Davy 1500 ton press was the largest machine installed at the Locomotive Workshops. The Davy Hydraulic Resevoir in the left foreground and the Davy Steam Intensifier just behind it are part of the Davy Press assemblage as well as the steam system. Photo by D. Godden 1985.

The Oliver Hammers (Allen Strikers)

Two steam powered Allen strikers remain of the four which were previously installed in Bay 2 south. These strikers were made between 1899 and 1916. The strikers are operated by pedal by the blacksmith who also manipulates the material being worked and these machines most closely represent the action of the human striker. After the Second World War many of these machines in other industries were almost entirely replaced by small electro-pneumatic hammers which are also operated by the smith.

The strikers have their own dedicated early model water-cooled Tyere furnaces with the cast iron hood and an extensive collection of tongs and fullers. The strikers were used throughout the Railway workshops for completing small forging tasks and for sharpening tools.

The strikers are in excellent condition and, although they have not been taken apart, appear to be in almost operable condition.

Figure 4.70: The Oliver Hammers (Allen Strikers). Photo: Don Godden 1985

Figure 4.71: The Blacksmith's Forge located in Bay 2 south was used for heating small objects to high temperatures. The objects were then forged by hand by the blacksmith, or the electro-pneumatice hammers or the Oliver Hammers (Allen strikers). The workshops originally had 9 of these forges and this forge is one of the remaining four. It is believed that the forges were made at the Eveleigh Foundry which was located outside Bay 4 but has since been demolished. Photo: D. Godden 1995.

4.6.4 Assemblages of Items within the Workshops

The Electro-Pneumatic Hammers

The 7 cwt electro-pneumatic hammer located in Bay 1 south and the two 2 cwt electro-pneumatic hammers located in Bay 2 south, are all by B & S Massey of Manchester. The electro-pneumatic hammer was a great advance on the steam hammer. The machine itself is self-contained with an electric motor that drives a piston through a conrod, which forces compressed air through a valve into the operating cylinder which depresses and raises the hammer.

The electric motor operates continuously driving the air piston while the hammer piston is activated by a lever. On large hammers the lever is operated by a foreman blacksmith who stands beside the hammer and does not directly manipulate the work which is done by assistants. On the smaller hammers the blacksmith actually operates the hammer with a foot ring.

All three hammers are assemblages and are associated with wall cranes, their own dedicated furnace and a large collection of tongs, dies and stamps.

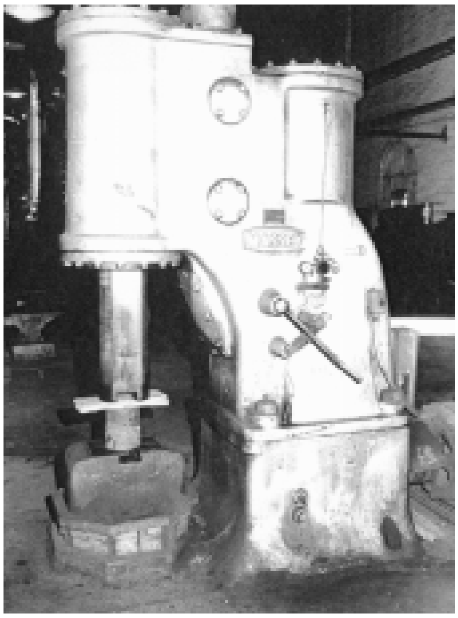


Figure 4.72: Bay 1 south. The Massey Electro-Pneumatic Hammer was a relative newcomer to the Blacksmiths Shop. Photo: D. Godden 1985.

The Impact Punch

The Impact Punch by Bretts is located at the north end of Bay 1 south. The machine is now electrically driven but because of its form appears as though it was originally driven by overhead line shaft. The machine is old, reputedly being installed in 1899. The small electric motor, which is now mounted at the top of the machine, drives a massive flywheel through a pulley. The punch is activated by pedals, and works by applying alternate blows to the two working tables located on either side of the machine.

The machine is part of an assemblage, has a furnace located nearby, and although material could be worked cold, large sections were worked hot. Associated with the machine is a large selection of dies and punches. The machine appears to be in excellent order and was operated as recently as 1992.

Figure 4.73: Bay 1 south. The Bretts impact punch exhibits all the characteristics of late 19th century medium engineering machinery with its massive cast iron body, lack of safety equipment and drive mounting. Photo: D. Godden 1985.

The Electric Shears

The De Burgue electrically driven shears are located in the small skillion roofed annex outside Bay 1. This machine exhibits all the hallmarks of the massive cast iron machines manufactured before World War I. The exposed gearing allows very slow and very powerful shearing action to cut various sections of steel up to 50mm thick. The shears are associated with a small table and are equipped with a built-in jib crane. A small trolley on rails assists the location of the work.

The condition of the shears is excellent and they are often used by Mr Guido Governor the resident blacksmith.

Figure 4.74: The De Burgue shears in Annex 1. Source: Jean Rice 2002

Metal Shears or Guillotine

The metal shears or guillotine by James Bennie and Sons, Glasgow, Clyde Engineering Works, Goven, Glasgow, was manufactured probably before the First World War. The shears are for cutting plate up to 12mm thickness. The machine is driven by an electrically powered flywheel from a motor which is mounted on the machine itself. The machine has a single action with no apparent adjustment for depth of cut.

The condition of the machine is excellent and in 1988 was fully equipped with a set of tools for its fine adjustment and overhaul. Spare blades were also available. The shears are thought to be in operating condition. When workshops closed down the shears were freshly painted on the orders of the boilermaker foreman.

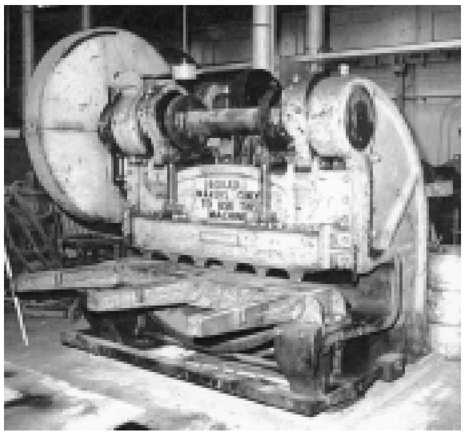


Figure 4.75: Bay 4 South. The James Bennie and Sons metal shears were used by the boilermakers for cutting boiler shell plate to the correct size. Photo: D. Godden 1985.

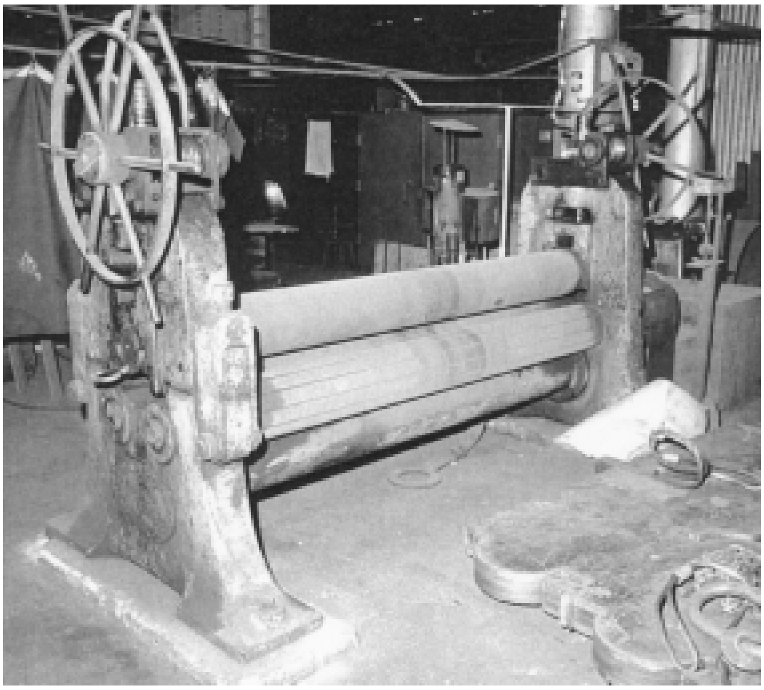


Figure 4.76: Bay 4 South. The Craven Horizontal Plate Roller was manufactured by Craven Bros. of Manchester in 1886 and is one of the oldest machines in the Workshops. Photo: D. Godden 1985.

The Horizontal Plate Roller

The horizontal plate rollers by Craven Bros, Manchester, were manufactured in 1886 and are amongst the oldest pieces of machinery in the workshops. They were located in Bay 4 south in 1995. The southeast corner of this bay was part of the boilermaker's shop, but their original location has not been determined. Originally the plate rollers would have been powered from the overhead line shaft. They are fitted with a removable top roller, which facilitates the rolling of boiler shells or boiler shells strakes.

The horizontal plate roller appears to be in good condition and was operated in the early 1990s.

A second small set of plate rollers was located close to the Craven Bros. roller. These were manufactured by the Railways themselves sometime in the twentieth century. They are lighter in construction and are suitable only for lighter plate. Again, these departmental rollers are in very good condition.

The Continuous Forging Machine

This machine, by the Ajax Manufacturing Co., Cleveland, Ohio, USA, was installed in 1922. The machine is belt driven by a separate electric motor. The machine has a series of dies and swages associated with it which are located nearby and it is equipped with its own dedicated oil-fired furnace. This is the smallest of two of the continuous forging machines which were operating at Eveleigh in 1986.

The continuing forging machine is in excellent condition and is at the moment being operated by Mr Guido Governor.

Figure 4.77: Continuous Forging Machine made of cast iron. Metal rods were fitted into the machine, which cut them to the required length. The machine manufactured rivets, bolts and pins that were used in the workshops as well as througout the state. Photo D.Godden 1985.

Collection of Swages

In 1995, in a massive steel tool stand located at the south end of Bay 4 there was a series of dies and swages. This is now in Bays 1 & 2, refer to detailed report. This collection belongs to several of the machines throughout the workshops and is invaluable to their operation.

This collection appears to be in good to excellent condition and although the precise use of all of the elements is not known all should be conserved.

The Wall Cranes

Throughout the workshops there are a number of wall cranes. These cranes are located in Bays 1 to 5 as wall as Bays 7, 8, 10, 11, 12, 13, 14, 15 and 16 (old Bays 1 to 4A as well as Bays 6, 7, 9, 10, 11, 12, 13, 14, and 15). They indicate the way in which the workshop is operated and are ideal interpretative devices. Some of the cranes are complete, such as those in Bay 1, which are dedicated to certain forging machines and furnaces. Others, whose precise purpose is unknown, are not complete and the hoisting equipment, either hand or electrically operated, has been removed at the time of the closure of the workshops. Most of the wall cranes are in good to very good condition.

The Rail Lines and Turntables

In order to operate efficiently a series of rail lines ran around and through the workshops. In some cases these lines were made for locomotives to traverse in other cases they were simply for rolling wheel assemblies prior to machining or repair. The rail lines that ran along the south wall of the workshops were amongst the most important. They were removed in 1996. The southmost tracks ran from the traverser at the west end of the workshops immediately in front of the corrugated iron clad buildings to a turntable immediately outside the weighbridge. The turntable then turned the rolling stock and locos through 90° this line ran between the spring shop and the main workshops east wall. When the works were closed in 1988 a small locomotive steam crane was parked on the rails some 20m south of the northeast corner of the workshops building.

These lines, when inspected in 1990, were in good condition. The inner tracks, which ran again from the traverser to the end of Bay 1, had turntables at Bay 1, 4 and 10 (old Bay 11). Two turntables have been retained in the road but the longitudinal rails have been removed. Some of the rails to the building remain. They require interpretation so their former use can be understood.

4.6.5 Collections Within the Workshops

The major collection within the workshop are the electric overhead travelling cranes which are often referred to as EOHTs of which there are thirteen in the workshops. The cranes are presently located in Bay 1, Bay 3, Bay 4, Bay, Bay 5, Bay 7, Bay 9, Bay 10 (two cranes), Bay 11, Bay 12, Bay 13, Bay 14 and Bay 15 (old Bay 4A, Bay 6, Bay 8, Bay 9 (two cranes), Bay 10, Bay 11, Bay 12, Bat 13 and Bay 15). The cranes were used for transverse movement of goods throughout the workshops. Longitudinal movement was achieved through the outside rail lines and the central set of lines through the workshops.

All cranes operate on 600V DC electricity although some have motors which are rated at 550V DC. All cranes have three motors with an underslung cabin equipped with three motor controllers in cast iron cases with massive high duty copper contacts. The earliest crane is in Bay 4 and bears the insignia Craven Bros Manchester 1886. Other cranes are believed to date from the same period. Until 1901 it is believed that all cranes still operated from the wall mounted steam engines at the south end of the building. It not clear if these where those that drove the line shafting and where additional motors were located. These engines were believed to be Tangye vertical two piston engines which were all powered from the boilers at the end of Bay 2.

Overhead cranes are made specifically for individual locations and are not simply bought from the shelf. Each one of the cranes at present in the workshops was designed and made for that particular Bay to carry out a specific series of tasks. The cranes in the main are not interchangeable.

It is believed that all cranes could be made serviceable and that all would meet requirements of Workcover. It is believed that all cranes are complete and that all are equipped with serviceable hoists. However, in most cases the tools used to maintain them are missing as are the slings that were normally found at the north end of each bay.

Associated with the cranes are various access ways, particularly on the end walls, which are essential to the operation of the cranes.

4.6.6 The Traverser

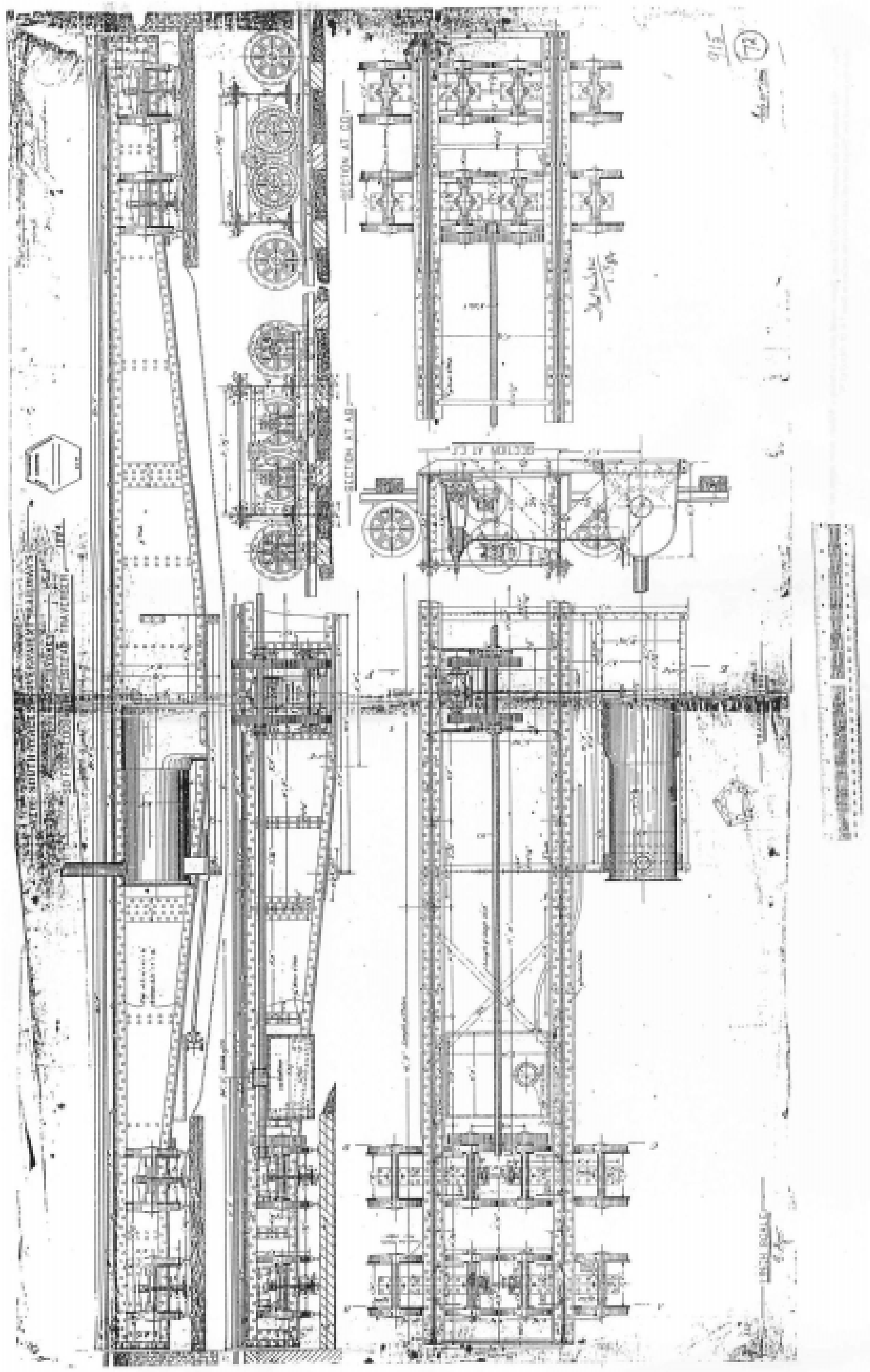
The traverser was an independently powered platform which runs on a set of rail tracks perpendicular to a series of working tracks and which can move a locomotive or piece of rolling stock from one set of working tracks to another set. The last traverser in the locomotive workshops was located at the west end of the building. In all when operating the traverser serviced 12 tracks from the marshalling yards, 6 tracks of the erecting shops and 4 tracks which ran towards and behind the wheel press shops and at least 3 tracks which ran along the central and eastern sides of the main workshops (see plan). The traverser's rail lines were about 80m long and were laid on reinforced concrete piers capped with steel capitals. In all, the traverser was equipped with 5 axles each which had a set of flanged or double flanged wheels. Bearing blocks for the axles were located above the axle and in fact the platform was slung from the axles rather than resting on it. This meant that the trench in which the traverser ran was only some 600mm deep. The traverser was equipped with a small cabin 4m x 2m x 2m high in which the motor controller and the electric motor was mounted. It is not known if the traverser was the original steam powered one which ran in Bays 7 and 13.

Figure 4.78: Traverser tracks on the west side of the workshops. Photo: Otto Cserhalmi, 1996.

Figure 4.79: The traverser in its bed next to the Spring Shop. The southern wall o fthe Locomotive Workshops can be seen in the left of the photograph. Both the traverser and Spring Shop have been removed. Photo: ATP Archives.

In 1995 the traverser had been removed from its road and the south end of the road altered. The condition of the traverser was fair and a small external cabin has been erected over the original cabin and the pategram has been dissembled and stored outside. The traverser like most other machines within the workshops ran on 600V DC power and was operating in 1988 when the workshops closed. The trench in which the traverser ran has been filled with sand which was then topped with bitumen. This was done to facilitate the operations of Paddy's Markets and to improve access to ACDEP and the west end of the erecting shop.

During construction work in 1996 the traverser bed was revealed and care was taken to conserve it during construction of machinery footings and service installation. In 2002 the traverser was relocated to the machinery display in Bay 10N (old Bay 9) and its final location is under consideration.



Plan 4.4: 1884 drawing of the Locomotive Steam Traverser. Shows an overall section including a Willan's steam engine and the pit in which the traverser ran. The pit may still exist below the surface in Bays 8 & 13 (old bays 7 & 13. SROA ELW

4.7 ARCHAEOLOGICAL RELICS

Archaeological remains at the Locomotive Workshop consist of visible remains and underground and concealed remains. They can be predicted from early plans and a knowledge of the processes. Many relate to former configurations and are noted throughout this report.

Visible remains include brackets, which formerly suspended line shafting and a range of features, which have been identified in detail in the Building Fabric Inventory.

The underground and concealed remains are elements of the building itself and its former configuration as shown on plans and items related to machinery. They can be predicted to include:

- Chimney base and flues, south side of Bay 2.
- Traverser pits, Bays 8, 14, and west of Bay 16 (old Bays 7, 13 and west of Bay 15).
- Pits in Bays 6, 7, 9 and 13 (old Bays 5, 6, 8, and 12).
- Footings and features of Core Store, Sand Store, Tinsmith's and Coppersmith's Shops in Bay 5 (old Bay 4a).
- Footings for former wall engines.
- Foundation blocks for motors, boilers and other machinery.
- Rail and trolley lines.
- Underground ducts, flues and pipes, especially in Bays 1-4.
- These features are shown on Plans 2.4, 2.6, 2.6, 2.7, 2.8, 2.13 and 3.1.


Figure 4.80: Bay 1. Boring under foundations to check the efficacy of the original downpipe system

4.8 SERVICES

Almost all services in the building were completely replaced when adapting it for new use. Historic fabric not used was generally left *in situ*.

Historic Stormwater Drainage

The historic stormwater drainage system for the building is described earlier in this section. It is a carefully designed system integrated with the building's structure. Stormwater lines serve every column with lines running longitudinally in the bays to a main line on the north of the building in Bays 1-4 and both to the north and south in Bays 6 – 16 (old Bays 5-15). Lines appear to run under the pits in Bays 6, 7, 9 and 13 (old Bays 5, 6, 8 and 12) and collect drainage from the pits. It is presumed that the downpipes are within the walls in Bays 15 and 16 (old Bays 14 and 15) but this has not been investigated and there is no sign of damp damage as there is in the east wall.

Sewer Drainage

The former sewer drainage system is minimal for the size of the building and connects largely to toilet facilities on the south wall and to a few basins within the building. It is of little heritage value and a new system has been installed.

Electricity

The building was an early user of electricity with its AC connection in 1912 to Ultimo Power Station. Conversion to electric power continued gradually until 1914. The overhead travelling cranes operate on DC electricity the earlier ones having been converted from rope drive steam power. The power was generally run overhead along the lines of columns between bays with more modern installations on cable trays. It is not known if early installations of heritage value survive but samples of a range of types should be retained (though not in service). New supplies are for general office use and are not adequate to service large machinery.

Lighting

Natural lighting provided the bulk of working light through extensive skylighting. Additional electric lighting, probably installed in the early 20th century, is industrial type metal pendent fittings. These fittings are compatible with the buildings character but were mostly removed. Remaining early fittings should be retained. New lighting is installed througout.

Fire Services

A modern fire hydrant service was installed by Paddy's Markets though later disconnected. A new fire detection and suppression system has now been installed and complying means of egress installed.

Oil

An oil burning system was installed to power some machinery in Bays 1-4 soon after WW2. The earlier pressure vessels located outside Row 1/2 on the east wall were converted for oil storage as was a former locomotive component located on the south of Bay 2. These tanks are linked by supply lines to a line that formerly ran over the road to the south of the building. The tanks and lines remain but are not operational.

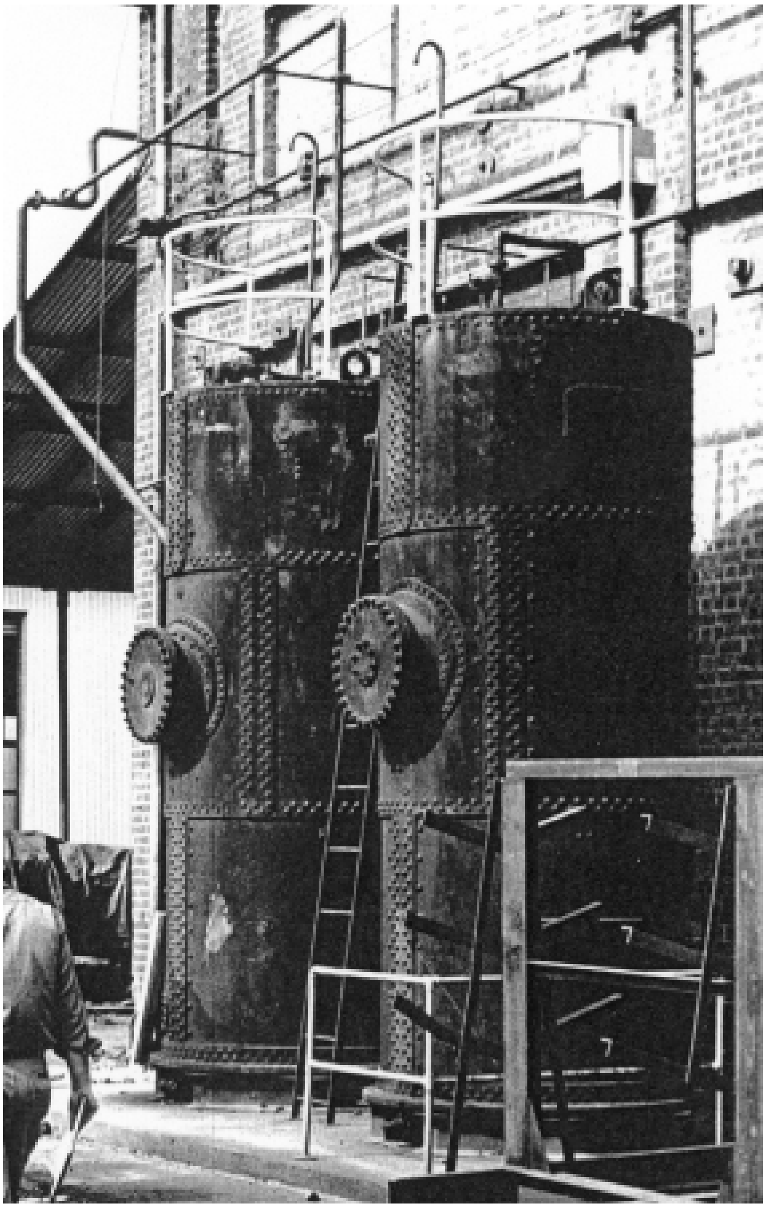


Figure 4.81: Bay 1 east exterior. Fuel oil reservoir. Photo: D. Godden 1985.

5.0 ANALYSIS AND STATEMENT OF SIGNIFICANCE

5.1 BASIS OF ASSESSMENT

The basis of assessment used in this report is the methodology and terminology of the *Burra Charter*, *The Conservation Plan* and the criteria of the NSW Heritage Office. Article 26.1 of the Burra Charter (1999) states that:

Work on a place *should be preceded by studies to understand the* place *which should include analysis of physical, documentary, oral and other evidence, drawing on appropriate knowledge, skills and disciplines.*

Once the place has been studied, the cultural significance can be assessed. Article 1.2 of the Burra Charter defines *cultural significance* as the *aesthetic, historic, scientific, social or spiritual value for past, present or future generations.*

The significance of the place is determined by the analysis and assessment of the documentary, oral and physical evidence presented in the previous sections of this document. Understanding significance enables decisions on the future management of the place. It is important that the future decisions do not jeopardise the cultural significance of the place.

The sites of the Locomotive and Carriage Workshops are intimately related and features of each enhance the understanding of the other. Thus the surviving line shafting and traversers in the Carriage Workshops demonstrate features that complement the Locomotive Workshops. Similarly, the surviving machinery in the Locomotive Workshops demonstrates equipment missing on the Carriage Workshops site.

This report addresses the Locomotive Workshops only but it should be noted that the combined sites have a higher level of significance than either on its own. The combined sites have exceptional significance. The statement of significance is structured with a statement about the whole of the Eveleigh Railway complex to put the building in that context. There is also a statement for the building and one for the machinery.

5.2 ASSESSMENT OF SIGNIFICANCE - THE EVELEIGH RAILWAY YARDS

The Assessment of Significance is based on the criteria issued by the NSW Heritage Council. Refer to Section 4A(3) NSW Heritage Act.

CRITERION A

An item is important in the course, pattern, of NSW's cultural or natural history (or the cultural or natural history of a local area).

The Eveleigh Railway Workshops demonstrate the history of the NSW Government Railways, as evidenced in components dating from the initial construction phase 1880-1895, the subsequent layers and modifications which are evidence of expansion in 1895-1927, the change of direction and technological change from 1927-1945 and the gradual decline and finally closure from 1945 to the present.

The site and its components are evidence of how nations, and in particular Australia and NSW, embraced 19th century railway technology and rail as a major transportation mode.

The Eveleigh Railway Workshops parallel world trends in the establishment and development of railways.

The Eveleigh Railway Workshops are part of a colonial phenomenon where British railway technology was 'exported' to the colonies.

The site is associated with the expansion of railway networks that supported the unprecedented development of rural NSW and Sydney suburbs at the end of the nineteenth century and the early twentieth century.

The large-scale infrastructure on the site demonstrates Government confidence in establishing and expanding rail networks in the late nineteenth century. The establishment of railway infrastructure by Government differs from overseas railway development by private industry, as was the case in Britain and America.

The place was the scene of debate and interaction between designers, officials and Government over expenditure on, and expansion of, the NSW Railways and this is recorded in parliamentary papers and other sources.

The development of the yard stimulated the development of the surrounding areas with worker's housing and the links are evident in suburb names such as Darlington. The name of the yards remembers Eveleigh House, a villa, now long gone.

CRITERION B

The item has strong and special associations with the life and work of a person or groups of persons of importance to NSW's cultural or natural history (or the cultural or natural history of a local area).

The Eveleigh Railway Workshops site and its infrastructure is associated with the life and work of the early railway engineers John Whitton and George Cowdery, George Elston, William Thow, Edward Lucy, Robert Harvey Burnett, individuals whose life and work made significant contribution to the establishment, development and operation of railways in Australia and NSW.

The site as a whole was a key site in many union activities such as the great strike of 1917. There is physical evidence of improved working conditions gained by the unions, such as the additions of toilet facilities and lighting. Many prominent political figures gained their initial activism at Eveleigh and went on to represent workers as union leaders and the community as members of Parliament such as Jack Lang. There are strong associations with the international labour movement in the early 20th century.

CRITERION C

An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or a local area).

The main workshops at Eveleigh are among the finest industrial buildings to be built in Sydney in the late Victorian period: they are finely crafted and show innovative use of materials and structure. The main buildings have a finely developed aesthetic arising from their scale, sophisticated proportions and the rhythm of the classically derived facade treatment which is carefully composed with pediments, columns and panels and brick detailing.

The elements of the buildings combine to produce a pure functionalist aesthetic expressed by design, materials and detail which evolved from the late Victorian period through to the 20th century. The design is directly derived from the function and limits of the overhead travelling cranes, which define the bay width. Railway architecture and building is evidenced in key elements including rails and traversers, the brick buildings and exposed structural elements in the design of the buildings.

Rail level generates the base line of the building and rails are used in all sorts of structures such as fences and lean-to additions.

The site has landmark qualities experienced in the views and vistas to the site, particularly from the railway line, where the size of the complex, the scale of the facades, the spatial arrangement of the buildings and elements on the site distinguish it from other sites.

The site and its components are iconographic, symbolising the past greatness of railways.

The brick facades are a recognisable image, a gateway that visually defines a point on a journey to or from the city centre signalling the approach to Central or departure from the city.

CRITERION D

An item has strong or special associations with a particular community or cultural group in NSW (or local area).

The site is integral to the development of the surrounding suburbs and has important social and physical associations with these areas.

Over its one hundred years of operation substantial numbers of the community including post WW II migrants and apprentices worked at Eveleigh and there are many former workers who have a strong identification with, and a sense of pride in, the place.

The site has associated perceptions as a place of excellence and service and a symbol of Australia's ability to compete and excel on a world scale.

For some former workers the site evokes memories of the trade unions and work practices and is a key site in the development of the union movement in Australia and the employment of women in industry, particularly in war time.

The closure of the works generally was seen as the end of a micro-community heralding the end of a working-class sub-culture and many see the works as representing a bygone approach to work and life.

The place was a training ground for apprentices, many of whom left the railways for private industry so it is seen by many as providing a sound basis for young men to begin their working life as skilled tradespeople.

CRITERION E

An item has the potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of a local area).

The Eveleigh Railway Workshops demonstrate the evolving process of how engines and carriages were built and maintained during more than a 100 years of railway history in NSW.

Alterations, additions and modifications on the site completed while in Railway ownership, and sites of extant buildings show the phases of railway building, running and expansion and more recent contraction of rail services in NSW. Much of the infrastructure, components and occupation of the site represent changes in technology over more than a hundred years of railways in Australia.

The design of the main buildings exhibit technical innovation in the large runs of brickwork without construction joints, and cast iron framed windows which show the way traditional architecture was translated into large industrial scale buildings. They have the potential to yield information about design and construction techniques.

The central location means the site is readily accessible to visitors and uniquely positioned to provide information.

CRITERION F

An item processes uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of a local area).

The Eveleigh Railway Workshops Complex is of exceptional heritage significance nationally and internationally as one of the best surviving examples of a 19^{th} century railway workshops where interrelated items and components demonstrate the evolving process of how engines and carriages were built and maintained during more than a 100 years of railway history in NSW. Few, if any, engines and carriages are made in Australia and few sites ever made both.

CRITERION G

An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places or cultural or natural environments.

The site with the buildings, artefacts including machinery and services, and circulation has potential through interpretation to demonstrate the process of both railway manufacture and maintenance originating in the 19th century and continuing with modification through the twentieth century.

The site has the potential to demonstrate industrial processes such as the steam power system transferring power to belt driven machinery and the railway processes of moving and working on heavy machinery.

STATEMENT OF SIGNIFICANCE - THE EVELEIGH RAILWAY YARDS

The Eveleigh Railway Workshops are of exceptional significance nationally and internationally as one of the best surviving examples of railway workshop complexes. Buildings, open spaces, circulation, rails, machinery, moveable items and services demonstrate the processes of railway manufacture and maintenance of engines and carriages and illustrate the processes of technological and operational change between 1887 to the present day. The site layout divided by the main railway line has rarity in comparison to other railway workshop complexes. The site and its fabric demonstrates the history and operation of the NSW Government Railways, as well as reflecting world trends, in the phases of establishment, expansion, and decline and closure.

The site is associated with the life and work of the early railway engineers, Whitton and Cowdery, Elston, Thow, Lucy, Burnett, individuals whose life and work made significant contribution to phases of railway history. The site evinces Australia and NSW embracing 19th century railway technology and Government confidence in rail as a major future transportation mode, which led to the unprecedented development of rural NSW and Sydney suburbs at the end of the nineteenth century and the early twentieth century. In contrast to international railway systems, the site is part of a railway infrastructure developed by Government rather than by private companies. The place provides evidence of the practice of colonial importation of British railway technology and models.

The main buildings at Eveleigh are among the finest industrial buildings to be built in Sydney in the late Victorian period. This is illustrated in the innovative use of materials and structure, the finely developed aesthetic arising from their scale, their sophisticated proportions, the rhythm of the classically derived facade treatment and carefully composed pediments, columns and panels and brick detailing. The design of the main workshop buildings exhibits technical innovation in the large runs of brickwork without construction joints, metal-framed windows and the lightweight long span trusses.

The site elements combine to produce a pure functionalist aesthetic expressed by design, materials and detail evolving from the late Victorian railway architecture through to 20th century. Evidence of this can be seen in key elements including the rails and traversers, the unpretentious brick and the corrugated iron buildings with exposed structural elements, the situation of buildings at rail level and the use of rails in all sorts of structures including fences and lean-to additions.

The site has landmark qualities experienced in the views and vistas to the site, particularly from the railway line. The size of the complex, the scale of the facades the spatial arrangement of the buildings and elements on the site distinguish it from other sites as a recognisable image, a gateway which visually defines a point on a journey to or from the southern edge of the city. The site is iconographic, symbolising the past phenomenon of the greatness of railways. The site is integral to the development of the surrounding suburbs and has an important physical and social association with these areas.

The Eveleigh Railway Workshops site has strong cultural and social associations for a substantial portion of the community, including post WW II migrants and apprentices who worked on the site. There is a strong identification and a sense of pride in the place as one of excellence and service and as a symbol of Australia's ability to compete and excel on a world scale. The site as a whole was a key site in many union activities such as the great strike of 1917, which are expressed in the physical evidence of improved working conditions gained by the unions. The closure of the works generally was seen as the end of a micro-community heralding the end of a working-class sub-culture and many see the works as representing a bygone approach to work and life.

5.3 ASSESSMENT OF SIGNIFICANCE - LOCOMOTIVE WORKSHOPS BUILDING

CRITERION A

An item is important in the course, pattern, of NSW's cultural or natural history (or the cultural or natural history of a local area).

The size and quality of the Locomotive Workshops indicates the importance of and faith in the establishment and development of railways in the late nineteenth century. The changes to the building represent phases of development and change. The cessation of works within the building represents the decline of railways as major transportation mode in the 20th century, and the redundancy of the building reflects changes in technology and the relocation of railway construction and servicing.

CRITERION B

The item has strong and special association with the life and work of a person or groups of persons of importance to NSW's cultural or natural history (or the cultural or natural history of a local area).

The building is associated with historic figures in NSW such as Jack Lang, George Cowdery and John Whitton. The building is associated with historic events such as strikes and parliamentary inquiry. Photographs survive of 1917 strikebreakers standing on locomotives within this building. The building is associated with local industries and builders who enabled its construction.

CRITERION C

An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or a local area).

The building is a rare surviving example of the 'architectural' work of George Cowdery, better known for his designs for bridges and tunnels and other engineering works. It, and the Carriage Workshops are the best surviving examples of major buildings designed by Cowdery and is an example of the best work of builders John Ahern, George Fishburn and Harold Norris. The building displays some of the finest work of local industries, eg. the Globe foundry (some columns).

The building is a highly developed example of a cast and wrought iron structure in Australia and demonstrates an exceptional standard of design, construction, craftsmanship and unity of materials. The building has elegant, restrained and well proportioned brick facades with stone dressings.

When built it was the most technologically advanced and largest railway workshop in Australia. The building demonstrates engineering precision in a building with an extraordinarily carefully and ingeniously resolved structure, apparently simple, yet multi-functional and complex. The cast and wrought iron structure in particular has a high degree of technical excellence. The ingenuity of the design is seen in the piered footings that provide structural support and the integrated system of columns, girders, crane tracks, gutters and downpipes.

Internally and externally the large scale and industrial character expresses the power of 19th century industry. It has its own special atmosphere enhanced by noise, odour, smoke and light and it has a powerful sense of place, in particular when machines are in operation.

There is a high degree of integrity and authenticity the main building itself, its ancillary structures, the machinery, the rails and cranes and current and former drive and power systems. Other components of the place exist under the floor, including rails and pits in some bays.

CRITERION D

An item has strong or special associations with a particular community or cultural group in NSW (or local area).

The building is historically associated with former workers who trained and worked here. Blacksmithing was seen as the king of trades thus Bays 1 – 4 have particular significance to many former workers. Former workers emphasise the poor working conditions and demonstrate practices such as workers making newspaper hats to cover their hair to family who were not allowed in the place when it was operating.

CRITERION E

An item has the potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of a local area)

Famous and much loved classes of locomotives were produced and maintained in this building.

The building was used for the wartime production of weapons, evidence of which is in plans of the former Bay 5 South mezzanine and of the layout of machinery for making ammunition.

The building has potential to reveal information about construction techniques and design of cast iron and wrought iron buildings. The building has a high level of design interpretability because it is consistent to the smallest element. It has a high degree of authenticity because of its comprehensive set of detailed drawings. The building has educational value in showing architectural taste in how classical rules were applied to all parts.

CRITERION F

An item processes uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of a local area).

The Locomotive Workshops (along with Newport) is the largest surviving, intact, high quality railway workshop, dating from the steam era surviving in Australia and possibly in the world.

The building is the largest, earliest and best industrial building remaining in the Eveleigh complex and one of the finest remaining late 19th Century industrial buildings in Australia.

CRITERION G

An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places or cultural or natural environments.

The building with its large spaces, cranes, rails and machinery and associated historical records demonstrates steam powered industry and railway industry.

The place has archaeological remains, such as the infilled pits, traverser road, underground flues and core store in particular, and sub-surface remains generally, which have the potential to be excavated to further demonstrate how the place operated.

The proximity to the rail network, continuing rail link and the design of the building to rail level demonstrate the key determinant of railway industry and design of railway facilities.

STATEMENT OF SIGNIFICANCE - THE LOCOMOTIVE WORKSHOPS

The Locomotive Workshops (along with Newport) is the largest surviving, intact, high quality railway workshop, dating from the steam era surviving in Australia and possibly in the world. The Locomotive Workshops are part of the original construction of the Eveleigh Railway Complex and its size and quality of the building indicates the importance of railways at the time.

It was one of the largest continuously covered industrial spaces of its time in Australia and demonstrates nineteenth century industrial building development which required open plans to flexibly accommodate machinery and large numbers of men. Internally and externally the large scale and industrial character expresses the power of 19th century industry. It has its own special atmosphere enhanced by noise, odour, smoke and light and it has a powerful sense of place, in particular when machines are in operation. When built it was the most technologically advanced and largest railway workshop in Australia. The building is the largest, earliest and best industrial building remaining in the Eveleigh complex and one of the finest remaining late 19th Century industrial buildings in Australia.

The building is associated with historic figures such as Cowdery and Whitton, and historic events such as strikes and parliamentary inquiry. It is a rare surviving example of the 'architectural' work of George Cowdery, better known for his designs for bridges and tunnels. The building displays some of the best work of local industries and builders, John Ahern, George Fishburn and Harold Norris, who constructed the place. Their names are signed on the drawings and some are evident in the building fabric eg. the Globe Foundry.

Famous and much loved classes of locomotives were produced and maintained in this building and the building was used for the wartime production of weapons, evidence of which is supplemented by plans showing the layout of machinery for making ammunition.

The locomotive workshops is a highly developed example of a cast and wrought iron structure in Australia and demonstrates an exceptional standard of design, construction, craftsmanship and unity of materials. The building has elegant, restrained and well proportioned brick facades with stone dressings.

The building demonstrates engineering precision in a building with an extraordinarily carefully and ingeniously resolved structure, apparently simple, yet multi-functional and complex. The cast and wrought iron structure in particular has a high degree of technical excellence. The ingenuity of the design is seen in the piered footings that provide structural support and the integrated system of columns, girders, crane tracks, gutters and downpipes.

There is a high degree of integrity and authenticity in the building itself, its ancillary structures, the machinery, the rails and cranes and current and former drive and power systems. Other components of the place exist under the floor, including rails and pits in some bays. Elements missing here, such as an intact traverser and fly wheels on line shafts, remain in the Carriage Workshops. The cranes and surviving rails and rail level and the connection to the rail network demonstrate the key generators of the operation and design of the place. This has been compromised to an extent by recent work but the fabric still exists and can be interpreted.

The building's central and prominent location, physical attributes and close locations to complementary sites eg, Carriage Workshops, give it a unique ability for interpretation and education.

The building has educational value in showing architectural taste and how classical rules were applied to all parts of the structure. The building has a high level of design interpretability because it is consistent to the smallest element, interpretation of which is enhanced because of its comprehensive set of detailed drawings. It building has potential to reveal information about construction techniques and design of cast iron, wrought iron and steel buildings.

The place has potential archaeological remains, such as the infilled pits, traverser road, underground flues and core store in particular, and sub-surface remains generally, have the potential to be excavated to further demonstrate how the place operated.

5.4 ASSESSMENT OF SIGNIFICANCE - THE MACHINERY

CRITERION A

An item is important in the course, pattern, of NSW's cultural or natural history (or the cultural or natural history of a local area).

The technologically advanced machinery at Eveleigh enabled local production and maintenance of locomotives which were integral to the late 19th expansion of settlement in NSW.

The unprecedented scale of the machinery and its technological advancement led heavy industrial development and capacity contributing to the economic growth of the state.

CRITERION B

The item has strong and special association with the life and work of a person or groups of persons of importance to NSW's cultural or natural history (or the cultural or natural history of a local area).

The machinery itself does not have direct associations with persons of importance. Such associations are as part of the whole place.

CRITERION C

An item is important in demonstrating aesthetic characteristics and or/ a high degree of creative or technical achievement in NSW (or a local area).

The massive machinery and extensive tool collections, especially when in use, have a powerful industrial aesthetic which expresses the characteristics of heavy railway industry. They create a powerful atmosphere where the scale dwarfs individuals but expresses the achievements of people together. They also have strong sculptural qualities.

Many of the machines and systems were innovative and technologically advanced. Even today they can still produce items that cannot be made anywhere else in Australia e.g. Crown stays for the 3801 locomotive boiler.

CRITERION D

An item has strong or special associations with a particular community or cultural group in NSW (or local area).

Men who worked the machinery have especially strong associations with it, generated in part by the skilled but dangerous nature of the work. This has been recorded in oral history, photographs and videos.

CRITERION E

An item has the potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of a local area)

The combination of archaeological remains and machinery in system assemblages and collections is unique. It comprises forge, materials, handling and power facilities; has research potential about the operation of heavy industry and railway industries and the operation of particular systems.

The combination has high potential, educational value and interpretability because of its convenient location as well as the surviving physical fabric and records.

CRITERION F

An item processes uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of a local area).

Many of the machines are the largest, only surviving, largest collection etc, of their type in NSW. In other places, machinery has been scrapped, moved or never existed. The survival of operating machinery, or with the potential of operation, is rare.

CRITERION G

An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places or cultural or natural environments.

The combination of machinery systems, assemblages and collections is unique in NSW and demonstrates late 19th century forge and hydraulic power technology and materials handling systems on a massive scale.

The development, over time, demonstrates continuing technological change, particularly of the sources and operation of industrial power.

STATEMENT OF SIGNIFICANCE - THE MACHINERY

The Locomotive Workshops house the most complete set of authentic and operational (or with the potential to operate) late 19th century and early 20th century forge and hydraulic power technology in Australia. The set is superior to anything in the UK or USA. Midlands in the UK however, has a more complete early 20th century installation.

The remaining machinery demonstrates the functioning of sections of the workshop: in particular the forge, materials handling systems and power systems. The historical development of the machinery and associated power systems demonstrates continuing technological development throughout the life of the place as a railway workshop.

The extant early power systems, and the succession of power systems including hydraulics, steam, air, oil and electricity are rare surviving examples and demonstrate a continuity of technological development.

The machinery, in particular the cranes and the machinery in Bays 1 – 2 are an essential component of the sense of place and are an integral part of its industrial character.

- The Davy press is the largest steam press in Australia.
- The building houses the only known hydraulic system of its kind in Australia with the potential to be operated.
- The collection of overhead cranes is the best in Australia.

There is research potential into late 19th century technological development, the operation of specific equipment, and into steam, hydraulic and other power systems in industry.

The operating machinery and power systems enhance the educational value of the place. The working parts have the highest value and their survival in operable condition is rare, in particular the hydraulic system, the boilers and the air compressors.

The survival of complete examples of 19th and 20th century machinery and technology here allow an understanding of Australia as an industrial nation.

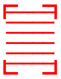
The significance is enhanced by the survival of missing elements at the Carriage Workshops and the potential to interpret them together.

5.5 LEVELS OF SIGNIFICANCE

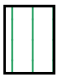
Levels of significance were ascribed in the previous CMP. The titles of the categories of significance have since been revised to reflect significance at International, National and State levels. The terms “interpretation” or “interpretability” are used in the sense of the ability to explain the meaning of the place/item, in order to make the significance of the place understood. It is also used when a component is of slight or no significance, meaning difficult or unable to be interpreted, not an important function, often subject to alteration, detracting from significance and/or significant fabric.

As previously stated, this report addresses the Locomotive Workshops only but it should be noted that the combined sites have a higher level of significance that either on its own. The combined sites have international significance.

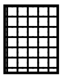
5.5.1 Levels of Significance - diagram



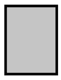
INTERNATIONAL / NATIONAL
Original fabric of elements integral to the place are of international or national significance



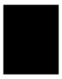
STATE
Considerable significance, fabric of additions crucial to functions and aesthetic value



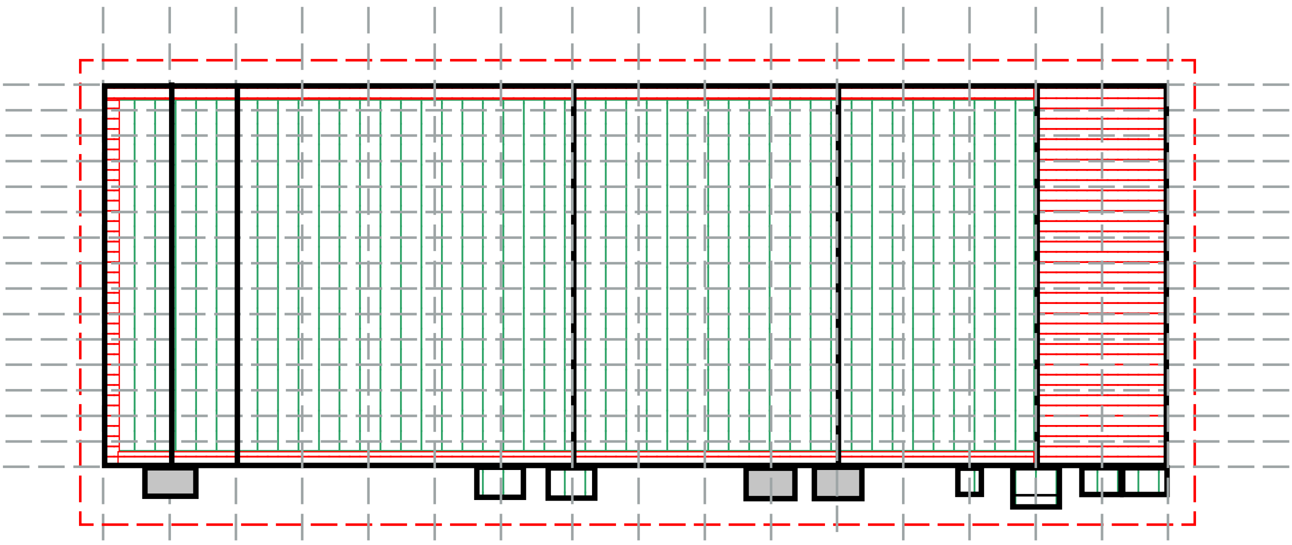
LOCAL
Some significance, changes relating to function and development

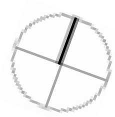


NEUTRAL
Items which do not impact on the significance



INTRUSIVE
Detracts from the significance.





5.5.2 Levels of Significance - Detailed

INTERNATIONAL / NATIONAL

The place as a whole has been ascribed a level of international and national significance, as together the Eveleigh Railway Workshops Complex has greater value than individual items.

The original major buildings, rails, machinery and their relationships, are integral to the design and operation of the place. The original fabric is essential to the existence of the place and understanding it and are of excellence in design and execution.

STATE

Items of State significance are the building, significant additions and modifications to the workshop. These items of considerable significance can be easily interpreted and understood providing information about the changing patterns of use of the place. They are often of a high level of design and workmanship and are crucial elements of the place's operation. They include:

- Bays 2-16 (old Bays 2-15)
- Original annexes and additions to them
- Towers added to Bay3, 4 & 5

LOCAL

Items of local significance are those which perform a secondary function in relation to the use and development of the place. It includes significant changes, which are not crucial to the functional or aesthetic value of the place but relate to the function and development of the place generally, and which are capable of interpretation. They include:

- Twentieth century offices in Bays 1 & 2
- Windows added at upper levels
- Openings made to accomodate the Davy Press etc

NEUTRAL

'Neutral' items are those which do not impact on the significance of the place or may be unsympathetically altered early fabric or additions. This includes modifications where, although they indicate the changes in use over time, the actual fabric is not significant. Some items may be difficult or impossible to interpret or may be detracting from the significance of the place and fabric of greater significance. They include:

- Annexes added in 1996
- Mezzanines added in 1996
- New roofing added over existing in 1996

INTRUSIVE

Those items, which, in their present form, adversely affect the significance of the place have been assessed as "intrusive". This category includes introduced fabric that may have resulted in damage to significant fabric. It also includes visually intrusive fabric, which obscures the reading of the significant uses and periods of development. They include:

- Machinery stored in inappropriate locations
- Modern fitout which impedes crane movement
- External planter boxes
- Rusting metal inserts in masonry
- Carpet in main public spaces on ground floor

5.5.3 Recommended Treatment of Each Level Of Significance

INTERNATIONAL / NATIONAL	Retain all fabric. Preserve, restore, and reconstruct in accordance with the Burra Charter. If adaptation is necessary for the continued use of the place, minimise changes, do not remove or obscure of significant fabric. Design changes so they are reversible.
STATE	Aim to retain all fabric as above. Preserve, restore, and reconstruct in accordance with the Burra Charter. If adaptation is necessary for the continued use of the place, minimise changes, do not remove or obscure significant fabric. Design changes so they are reversible. In this case the condition of some of the elements may affect the feasibility of conserving them.
LOCAL	Aim to retain most of the significant fabric. Conservation of the overall form and configuration is desirable. Items may already be substantially altered and can accommodate further major changes. Compatible new construction can be added and fabric removed in part as necessary to accommodate new uses. If adaptation is necessary, more changes can be made than would be possible for fabric of state significance, but the same principles apply. Where possible make additions reversible. Retention may depend on issues other than heritage value, such as financial viability.
NEUTRAL	Fabric of neutral significance may be retained, modified or removed as required for the future use of the place, provided that its removal causes no damage to more significant fabric.
INTRUSIVE	Remove or alter intrusive fabric to reduce the adverse impact when the opportunity arises, whilst minimising damage to adjacent fabric of significance.

6 CONSTRAINTS & OPPORTUNITIES

6.1 IMPLICATIONS OF SIGNIFICANCE

In order to formulate conservation policies for the Eveleigh Locomotive Workshops it is necessary to take into account a number of factors and constraints, which are raised in this section of the document.

The site of the Eveleigh Locomotive Workshops has historic, aesthetic, social and scientific/technical significance, and is rare at a national and international level and demonstrates the characteristics of railway workshop sites to a high degree.

The exceptional value of the place as a whole and the level of significance above other similar places rest on the assemblage value and the operational capability of the systems and machinery. To maintain the level of significance it is important that the systems and machinery be operational. This creates both constraints and opportunities for reuse. The highest value is attained when the machinery is used for production and/or interpretation. Operating machinery will also impact on how the space can be used and on adjoining areas with noise, dust and vibration.

The aesthetic value of the place and the technological significance of the structure offer opportunities for interpretation and suggest directions for the future design elements and future use. The recovery or enhancement of aesthetic value is sometimes at odds with the retention of evidence of the history of the development of the place and these conflicting requirements are further considered in policy development. The studied composition of the facades and careful detailing are important to the value of the place, which would be enhanced by reconstructing missing elements. Adjacent and attached development should have regard to this value. The industrial character is an important element of the aesthetic significance and should constrain the tendency to ‘clean up’ the place as has happened at Honeysuckle Point. Elements of the large, internal open spaces and exposed structure should preferably be retained.

The social value of the place implies that it should be accessible to those who hold it in high esteem and the scientific value implies that it should be available for research and educational purposes. This imposes a responsibility to provide a degree of public accessibility to the place in any development.

The implications of heritage significance will be commented on in detail in association with the development of detailed policies in Sections 7 and 8.

6.2 EXTERNAL REQUIREMENTS

The Eveleigh Locomotive Workshops, as part of the Eveleigh Railway Workshops complex, is the subject of various statutory instruments, which have an impact on the future uses, and management of the site. These are set out in the sections below.

6.2.1 Heritage Listings

The Eveleigh Locomotive Workshops, as part of the Eveleigh Railway Workshops in their entirety, are listed on the following statutory and non-statutory registers:

- Listed as the Eveleigh Railway Workshops under the Heritage Act 1977, on the *State Heritage Register (SHR No 01140).*
- Listed on the *State Rail Authority's Section 170 Heritage and Conservation Register.*
- Listed as the Eveleigh Railway Workshops on the *Register of the National Estate (RNE Nos 15903 & 5045103).*
- Listed on the *National Trust Register.*

In addition, a number of heritage items relating to the Eveleigh Locomotive Workshops have been individually listed as follows:

- The Eveleigh Railway Workshops Machinery is separately listed under the Heritage Act 1977, on the *State Heritage Register (SHR No 01141).*
- The Locomotive Workshops – Bays 1-15 (now renumbered Bays 1-16) including machinery in Bays 1-4, the New Locomotive Shop and the Works Manager's Office are listed under Schedule 4 Part 2 of *Sydney Regional Environmental Plan No 26 – City West* gazetted on 16 October 1992.
- As well as the general listing of the Eveleigh Railway Workshops machinery on the State Heritage Register, the individual items of machinery have been separately listed by the SRA as part of its *Section 170 Heritage and Conservation Register*.
- Various items of machinery have been included as part of the listing of the Eveleigh Railway Workshops on the *Register of the National Estate* and the machinery has been separately listed on the Register *(RNE No 5001063).*

Copies of the inventory sheets for the above items except for the SRA Section 170 individual listings for the machinery are included as Appendix A.

The Eveleigh Railway Workshops site has been the subject of two major studies, as follows:

- Eveleigh Railway Workshops Heritage Study Volumes 1-4 – Don Godden and Associates (1996)
- White Bay to Blackwattle Bay - Central to Eveleigh Heritage Study Volume 1 Final Report and Volumes 2- 4 Inventory - Godden MacKay 1990.

Individual items of machinery were listed in detail in a separate study by Don Godden in the mid 1980s.

The implications of the above listings are set out in Sections 6.2.2 to 6.2.5 which follow.

ARCHAEOLOGICAL POTENTIAL

An archaeological study of the ATP site, concentrating on the Alexandria Goods Yards concluded that there would be little evidence of the 1835-1880 phase of occupation and of the later nineteenth century residential occupation of the site (Thorp 1994:16). The report concluded that the potential archaeological resource within the ATP Master Plan area is that "it provides a record of the on-going evolution of the site, principally throughout the twentieth century … It is considered to have low significance" (Thorp 1994:18). In addition, the historical disturbance of the area has most likely destroyed Aboriginal evidence in the archaeological record (see also section 6.2.3 Aboriginal Sites and Relics).

6.2.2 THE NSW Heritage Act

THE STATE HERITAGE REGISTER

Items on the State Heritage Register are those items which have been identified as being of particular importance to the people of New South Wales, items that are of state significance or greater.

The Locomotive Workshops as part of the Eveleigh Railway Workshops as a whole have been listed on the State Heritage Register. The Eveleigh Railway Workshops Machinery is also listed on the State Heritage Register:

APPROVALS UNDER THE HERITAGE ACT

Proposals that involve modifications to buildings of State Significance listed on the State Heritage Register must be referred to the Heritage Council for approval. This includes any disturbance of archaeological relics. The Minister for Planning can approve site specific exemptions, on the recommendation of the Heritage Council.

The preparation of a Conservation Management Plan for items on the State Heritage Register is recommended best practice.

It is of particular importance for a building of this significance and complexity to guide its long term conservation and management in the context of the site as a whole.

Heritage Council approval is required for modifications to items of State Significance such as the Eveleigh Railway Workshops, unless the conservation works are in accordance with an endorsed Conservation Plan or Conservation Management Plan.

Following the endorsement of the Conservation Management Plan SHFA will not need to refer proposed *conservation* works at the Eveleigh Locomotive Workshops building to the Heritage Office unless the proposed works are outside the policies contained in this Conservation Management Plan.

The standard exemptions relate to *maintenance works, repairs, painting, excavation, restoration and conservation*. They are primarily intended to cover routine and periodic maintenance works rather than the adaptive re-use of buildings. The complete standard exemptions prepared by the Heritage Office are included in Appendix B and can be found on the Heritage Office website at: http://www.heritage.nsw.gov.au/index.html go to: *Publications/free publications to download/standard exemptions for work requiring Heritage Council Approvals*.

A Conservation Management Plan (following endorsement by the Heritage Council) can form the basis of exemptions under the Heritage Act. Work under *Exemption 6: Conservation Works,* which is undertaken in accordance with the Conservation Management Plan, do not need to be referred to the Heritage Office.

Work undertaken under the other Standard Exemptions still require the approval of the Heritage Council, including the preparation of a Statement of Heritage Impact. The Statement should demonstrate how the proposed work is consistent with the significance of the item or place. It should also indicate how it meets the requirements of the Conservation Management Plan.

The document *Eveleigh Railway Yards - Locomotive Workshops Conservation Management Plan* was prepared by the Heritage Group State Projects NSW Public Works in June 1995. The information in this document has now been updated and augmented by this 2002 CMP, which, following acceptance by the Sydney Harbour Foreshore Authority, will be forwarded to the Heritage Office for endorsement by the Heritage Council. Following this endorsement, the plan will provide the basis and guide for the appropriate uses and development of the Eveleigh Locomotive Workshops in the context of the Eveleigh Railway Workshops as a whole.

SECTION 170 REGISTER

Under Section 170 of the Heritage Act, each government instrumentality is required to establish and maintain a *Heritage and Conservation Register* that details each item of the environmental heritage the agency owns or occupies.

The Eveleigh Railway Workshops have been on the SRA Register since it was established in the 1980s.

Since the SHFA assumed control of the site in August 2000, the Eveleigh Locomotive Workshops have formed part of the SHFA property portfolio, and are in the process of being included on the SHFA Heritage Register.

In the recent amendments to the Heritage Act a new section has been added to Section 170: *Section 170A Heritage Management by Government Instrumentalities* that deals with management obligations of individual agencies.

If an agency intends to undertake any of the following actions regarding items listed on their Section 170 Register, they must give the Heritage Council 14 days notice regarding:

- Removal of an item from the Section 170 Register;
- Transfer of Ownership;
- Ceasing to occupy an item currently on the Register;
- Demolishing an item.

Government agencies are obliged to ensure that heritage items on their registers are maintained with due diligence in accordance with State Owned Heritage Management Principles approved by the Minister, and with heritage asset management guidelines issued by the Heritage Council. The Principles and updated guidelines are in preparation and will be finalised later in 2002, and will be consistent with the State Government's Total Asset Management (TAM) Policy. Heritage matters are required to be integrated into all stages of asset management, including:

- Maintenance
- Strategic Planning
- Approvals Process (DA's &c)
- Modifications
- Disposal of properties

The current *Guidelines for the Preparation of Section 170 Registers*, issued by the Heritage Council of NSW, recommend that proposals involving alteration, disposal or demolition (in part or in whole) of items of state significance be referred to the Heritage Council through the Heritage Office.

TOTAL ASSET MANAGEMENT

Heritage assets form part of the NSW government's resources to be managed under its Total Asset Management (TAM) process, within a NSW Government Planning Framework. The Department of Public Works and Services (DPWS) developed a Total Asset Management Manual, first released by the government in 1993, and most recently updated as TAM 2000.

As part of the assessment and decision tools in the TAM process, the DPWS has recently produced a *Heritage Asset Management Guideline* (DPWS Report No 01051 of January 2001). This document is available on the DPWS website at www.gamc.nsw.gov.au and gives guidance to government agencies on the integration of heritage into Asset Management at all levels from the strategic level through to routine maintenance.

The Guideline advises that *sustainable management of heritage items should be treated by an agency as part of its core business.* It also points out that problems and costs attributed to the use of heritage buildings are mostly due to backlog maintenance and past neglect rather than poor performance of the asset.

It gives guidance to agencies on the heritage management process, including identification of the assets, strategic planning, detailed planning, implementation and monitoring.

STANDARDS FOR MAINTENANCE

Section 118 of the Act enables the Regulations to the Act to impose minimum standards for maintenance and repair of a building, work or relic that is listed or is within a precinct that is listed on the State Heritage Register in relation to the following matters:

- the protection of the item from the weather
- the protection of the item from damage or destruction by fire
- security
- essential maintenance and repair.

Section 119 of the Act sets out penalties in relation to the failure of owners to comply with Section 118.

The minimum standards imposed under Section 118 of the Act are set out in the Heritage Regulation 1999 entitled *Part 3 Minimum standards of maintenance and repair.* Clause 11 of the Regulation requires regular inspections to be undertaken to ensure that the standards are met. Clauses 12, 13, 15 and 17 set out standards in relation to weather and fire protection, security and essential maintenance and repair, while clauses 14 and 16 set out additional measures that are required in relation to fire protection and security for unoccupied buildings.

Clause 18 provides that a conservation plan endorsed by the Heritage Council may vary these standards in relation to a particular item by providing that a standard does not apply, or by imposing additional standards.

STATE HERITAGE INVENTORY

The State Heritage Inventory lists some 20,000 heritage items which have been identified on statutory heritage schedules such as those contained in Section 170 Registers, LEPs and REPs. It is an electronic database that can be accessed via the NSW Heritage Office homepage http://www.heritage.nsw.gov.au to check heritage listings throughout the State.

6.2.3 The Nation Parks & Wildlife Act, 1974

ABORIGINAL SITES AND RELICS

In addition to other environmental and land management matters, the National Parks and Wildlife Act also includes provisions that apply to Aboriginal sites and objects. If Aboriginal cultural material is found during excavation activity, the National Parks and Wildlife Service must be informed under section 91 of the Act. Excavation would then require a permit issued under section 90 of the Act.

The National Parks and Wildlife Act has recently been amended. The new provisions come into effect in June 2002 although the printing of the ammendments has not been finalised. Two changes are relevant. The first is that the word *knowingly* has been removed and the word *desecrate* added. Aditionally, *relic* has been replaced with *object.*

Thus Section 90 (1) now reads: *A person must not destroy, deface, damage or desecrate or cause or permit the destruction, defacement, damage or desecration of an Aboriginal object or Aboriginal place*.

Section 90(1) pre 2002 amendment:
A person who, without first obtaining the consent of the Director-General, knowingly destroys, defaces or damages, or knowingly causes or permits the destruction or defacement of or damage to, a relic or Aboriginal place is guilty of an offence against this Act.

The other change is that *cultural heritage,* which includes Aboriginal heritage, will form one of the grounds for a Stop Work order issued under the Act.An Aboriginal Archaeological Survey has not been undertaken for this site.

The archaeological report prepared for the ATP site concluded that the level of ground disturbance, including the cutting and filling, undertaken on the site for railway purposes would leave little evidence of the earlier nineteenth century development (Thorp 1994: 16). Thus it is likely that little evidence of earlier Aboriginal occupation would remain.

6.2.4 The Australian Heritage Commission

The Australian Heritage Commission is a Commonwealth Government Agency that compiles and maintains the *Register of the National Estate,* an inventory of places of natural and cultural significance in Australia. The basis for assessment of significance is the methodology and terminology of the Burra Charter.

The Eveleigh Railway Workshops site was added to the Register of the National Estate in 1988.

A copy of the Register of the National Estate database entry for Eveleigh Railway Workshops is included in Appendix A.

Under the current Commonwealth legislation Commonwealth Ministers, Departments and authorities are obliged to protect places entered in the Register of the National Estate (RNE). Their actions must not adversely affect the national estate values unless there are no feasible and prudent alternatives. If there are no such alternatives, all reasonable measures must be taken to minimise the adverse effect. Also section 30 of the AHC Act requires that before a Commonwealth Minister, Departments or authorities takes actions that might significantly affect national estate value the AHC must be informed of the proposal and given time to consider and comment on it. The AHC Act was being reviewed at the time of writing and requirments may differ in the near future.

In practice, inlcusion on the Register of the National Estate imposes obligation on Federal Government Bodies and federally funded projects. Section 30 approval is required for works undertaken on land owned by the Commonwealth, or using Commonwealth funds.

6.2.5 The National Trust of Australia (NSW)

The National Trust of Australia is a non-government community based organisation, established in 1945, and incorporated by an Act of Parliament in 1960, dedicated to the conservation of Australia's heritage.

Although the National Trust has no statutory power it has a strong influence on community support, particularly with regard to a possible threat to a structure or place from insensitive development or the destruction of items of cultural or natural heritage significance.

The National Trust actively lists buildings, conservation areas and landscape elements on its register. Other statutory registers, particularly the Register of the National Estate, have used the National Trust listing as a basis of information for compiling their inventory sheets.

A listing for the Eveleigh Railway Workshops was approved by the trust in March 1986. The listing card specifies the Locomotive Workshops, the Works Manager's Office, the General Manager's Office, the Carriage Workshops Building, the Paint Shop, the Trimming Shop, and various items of equipment as significant. A copy is in Appendix A.

Proposals for the sale, leasing or adaptive re-use of any part of the site and/or buildings will be closely scrutinised by the National Trust who will seek to ensure proposals do not impact on the cultural significance of the place.

6.3 PLANNING ISSUES

6.3.1 PlanningNSW

PlanningNSW is the State Government department that deals with environmental planning issues and administers the Environmental Planning & Assessment Act 1979 [EP&A Act]. Under this act the Department prepares State Environmental Polices [SEPPs] and Regional Environmental Plans [REPs].

The Eveleigh Railway Workshops site was identified as being of regional significance in the early 1990s and was one of four precincts included in Sydney Regional Environmental Plan No 26 – City West (SREP 26) - the Eveleigh Precinct.

The aims of the SREP include the establishment of planning principles of regional significance for City West as a whole and for development in each precinct created within City West. In addition, it aims to promote the orderly and economic use and development of land within the area.

Clause 14 identifies the Minister for Planning as the consent authority for the whole or part of the site for which a Master Plan is required. SREP 26 Map 5 – Master Planning, identifies land within the precinct subject to Master Planning requirements. This includes the Eveleigh Locomotive Workshops.

SREP 26 Map 2– Land Use Zones, shows the land uses permitted in the Eveleigh Precinct. Land in the Master Planning area is zoned *Residential-Business*. Map 4 - Permissible Building Heights, identifies a limit of 12 metres for the Locomotive Workshops site, while Map 4 – Heritage Items, identifies the Eveleigh Locomotive Workshops, Bays 1-15 as a heritage item, including the machinery in Bays 1-4. The SREP also listed the New Locomotive Shop and the Works Manager's Office (now the National Innovation Centre and the International Business Centre).

Clauses in SREP 26 which relate to the heritage significance of the site and buildings as follows:

Clause 11 Planning Principles for City West:
One of the principles is entitled *Heritage* and requires that:

- items of heritage significance are to be conserved and enhanced
- new development is to respect the character of the heritage items and conservation areas
- the reuse of heritage buildings through adaptive re-use and modification is to be encouraged

Clause 13 Requirement for development consent:
Part 1 states that all development that is permissible requires consent except that described in Schedule 3. Development that does not require consent includes:

- demolishion of advertising structures, sheds, kiosks, roof structures, such as plant rooms (unless part of a heritage item)
- erection and use of outdoor seating, adjoining tables and like furniture in the public domain, associated with cafes etc and required to be licensed by a public authority
- real estate signs
- business identification signs (not erected on a heritage item) consistent with any urban development plan
- erection and use of public furniture, carrying out of street planting, roadworks etc by a public authority
- erection and use of public furniture etc in existing public recreation areas (but not including buildings)
- development of a heritage item, if in the opinion of the consent authority development is minor or is maintenance and does not adversely affect heritage significance.

Clause 15 Planning Principles for Precincts:
Part 2 sets out those for Eveleigh Precinct including:

- new development should make efficient use of surplus Government land and any heritage items on that land, and respect the height and scale of heritage items
- development involving former railway buildings and associated items of heritage significance is to result in their conservation and reuse.
- on-site parking is to be strictly limited and public transport use maximised.

Division 6 – Heritage Conservation Clauses 28-33 are the heritage clauses that apply to the heritage items on Map 4 and described in Schedule 4 Part 2.

- Clause 29 requires development of or in the vicinity of a heritage item to be compatible with its heritage significance.
- Clause 30 sets out heads of consideration for the consent authority to take into account prior to granting consent
- Clause 31 requires a consent authority to take into consideration a conservation management plan or heritage impact statement.
- Clause 32 states that before granting consent to development, which may include demolition of a heritage item, the consent authority must seek the views of the Heritage Council of NSW and consider any such views received within 28 days.

The SREP also identifies the need to provide a high quality public domain, which would cater for the needs of residents and workers within the precinct and pedestrian and cycle links within the precinct and to the surrounding areas.

6.3.2 Urban Development Plan

An Urban Development Plan (UDP) for the Eveleigh Precinct was prepared in terms of Clause 26 of SREP No. 26 – City West and adopted by the Minister on 13 July 1993. As stated in Clause 35 of the SREP, a UDP is a written instrument that makes more detailed provisions relating to development within a precinct then is contained in the SREP, with which it must be consistent. Clauses 34-39 of the SREP set out requirements for the preparation of UPD's.

The principal objective of the UDP was to ensure detailed planning and urban design controls complement SREP 26 to achieve a high standard built environment in the precinct.

Development principles are enunciated for a number of aspects of development on the site. Those set out for *Heritage Conservation* include:

- Conservation plans are required for heritage items which identify re-use options.
- Consideration must given to an appropriate level of conservation of Bays 1- 4a (now Bays 1-5) of the Locomotive Workshop and their contents. One such use may be that of a railway technology museum.

- An appropriate curtilage or setting shall be provided to protect the south facade of the main Locomotive Workshop building. In addition, adjacent new development shall be compatible in scale, height, form and materials

In addition, one of the principles is *The Character, form and siting of Buildings – Relationship to the Public Domain,* which states.

- Extensions to heritage items or new buildings in the vicinity of heritage items should relate to them in terms of height, form and architectural treatment.
- Existing views and vistas along streets and from public spaces to buildings and places of architectural, streetscape or heritage significance should be maintained or created.

6.3.3 Master Plan

The Sydney REP No 26 – City West designated the ATP site as a statutory master planning site. The requirements for a master plan are set out in Clauses 40-48A of the SREP. A Master Plan is a step in the planning process between the SREP and associated UDP and a development application. The aim of a Master Plan is "*to outline in broad terms the long term proposals for the development of the land….and to explain how those proposals address the planning principles and development controls"* (REP Clause 40).

A Master Plan was prepared for Australian Technology Park Sydney Ltd and adopted by the Minister for Planning in September 1994. Amendment No 1 to the Master Plan was gazetted on 5 May, 1998. The Master Plan and Amendment expired on 21 September, 1999.

The Sydney Harbour Foreshore Authority assumed control of the site in August 2000. The Authority has engaged consultant firm, Travis McEwan Group, who has revised the 1994 Master Plan. The draft *Australian Technology Park Eveleigh Master Plan* is being publicly advertised in March 2002, with a view to having it adopted by mid 2002.

The Master Plan 2001 vision is:
To establish a world class technology and business centre aimed at building global competitiveness in key growth sectors of the economy by facilitating:

- *Greater links in the value chain between the intellectual and research resources available in Sydney's universities and clusters of firms in strategic industries through applied research and product development;*

- *The establishment of industries on the Site that carry out scientific research and scientific development as an integral aspect of that industry;*
- *Adaptive reuse and interpretation of the original railway use buildings and elements which are of heritage significance and show the historical uses of technology;*
- *The establishment of uses on the Site that do not detrimentally impact in the historic, social, economic, natural or built environments of the surrounding locality;*
- *Construction of high quality innovative buildings and provide leadership in the provision of ecologically sustainable urban development and stimulating urban form; and*
- *An inspiring, inviting and safe public domain appropriate to a world class technology park* (Travis *et al* 2001: 16).

The objectives of the Master Plan in relation to heritage are to:

- Evaluate, conserve and reuse nominated heritage buildings
- Respect the character of the heritage buildings through the juxtaposition of new buildings and
- Evaluate and address the appropriate response to archaeological items

PUBLIC DOMAIN STRATEGY

The Australian Technology Park Public Domain Strategy was developed in June 1998 by City West Planning. The Strategy "developed a framework for the setting out the principles and design guidelines for the Public Domain" (City West Planning 1998:5). The major part of the public domain has been developed following this framework.

The Sydney Harbour Foreshore Authority engaged the firm, Architectus, to prepare an update of this strategy. A draft document was completed in January 2002. This document follows generally the recommended treatments in the earlier document, but proposes some detailed variation, and takes into account the work on the site to date and the changes in the draft 2001 Master Plan.

STATE ENVIRONMENTAL PLANNING POLICY NO 60 – EXEMPT AND COMPLYING DEVELOPMENT

SEPP No 60 identifies development that is exempt from the need to gain development consent, and development for which a complying development certificate can be issued.

Exempt development may not be carried out on the site of a heritage item that is listed as such in an environmental planning instrument or listed on the State Heritage Register, or is subject of an Interim Heritage Order.

Complying development cannot be carried out if there is a heritage item that is subject to an order or listing under the Heritage Act or in an environmental planning instrument or on land within a heritage conservation area designated as such in an environmental planning instrument.

As Eveleigh Railway Workshops site is on the State Heritage Register, neither exempt nor complying development can be undertaken on the site, which includes the ATP site.

DRAFT STATE ENVIRONMENTAL PLANNING POLICY NO 66 – INTEGRATING LAND USE AND TRANSPORT

The Draft State Environmental Planning Policy (SEPP) and the accompanying information – *Guidelines for planning and development* – form part of a State government strategy to direct growth and change in ways that are economically, socially and environmentally sustainable. The SEPP aims to influence the travel and transport patterns in this regard, and applies to all stages of planning and development in urban areas in NSW.

The general objectives of the SEPP are to:

- better integrate land use and transport planning and development
- provide transport choice and manage travel demand to improve the environment, accessibility and liveability.

Specifically, the SEPP will help to:

- reduce growth in the number and length of private car journeys
- make walking, cycling and public transport use more attractive.

The guidelines set out principles and criteria to assist in achieving the above aims, and expand on various issues in relation to their implementation.

Some aspects of the guidelines, which are particularly relevant to the Eveleigh Locomotive Workshops, are set out below:

- Studies of land capability and opportunity should consider accessibility as a major criterion for assessment, especially access by public transport
- DAs and proposals need to be accompanied by sufficient information for councils or other consent authorities to make informed decisions on likely transport outcomes
- public transport access should be designed and managed to provide lighting, shelter and safety
- good use should be made of existing public transport infrastructure
- parking policies should support location and urban design policies that seek to improve access by walking, cycling and public transport, and be explicit in their desire to moderate the growth in car use
- parking requirements should seek a balance between satisfying a proportion of demand, on-site parking, addressing car reduction objectives and minimising the spread of parking into surrounding areas.

6.3.4 South Sydney Council

The Eveleigh Locomotive Workshops site is within the local government area of South Sydney City Council, but is excluded from the operation of South Sydney Local Environmental Plan 1998 as it is part of the land to which Sydney Regional Environmental Plan No 26 – City West applies. The Council has no development consent role in relation to the master planning area designated on *Map 5 Sheet 2 Master Planning of SREP 26 – City West (Amendment No 1) – Eveleigh Precinct.* This area includes the site of the Eveleigh Locomotive Workshops. However, before granting consent to a development in the precinct, the Minister, as consent authority, must seek the views of the council, as well as those of the Director-General of PlanningNSW and the State Rail Authority.

SOUTH SYDNEY DEVELOPMENT CONTROL PLAN 1997 – URBAN DESIGN

In Part B of the Development Control Plan (DCP 1997), Eveleigh is identified as

- a “new growth area around railway stations and on large redevelopment sites” on *Map 2 Development Context*, and
- as a landmark site in *Map 3 Settings* which also identifies ridges and vantage points and views from the surrounding areas.

Part C sets out requirements for the Public Domain “the shared urban areas and spaces, the structures that relate to those spaces and the infrastructure that supports and serves them”. It identifies through site links required into and through Eveleigh from the surrounding areas in the *Map 6 Erskineville – Alexandria Public Domain Plan*. This plan also identifies buffer zones – “densely landscaped open space setback along the edge of the railway yard and rail lines” which is shown around the whole perimeter of the Eveleigh site. The modified DCP (2002) was compared to the 1997 DCP at the time of printing this report and it was found that no changes to this section had been made.

6.4 BUILDING HEALTH AND SAFETY REQUIREMENTS

6.4.1 Building Code of Australia

The Building Code of Australia (BCA) is the operative building ordinance for any work to the Locomotive Workshops. The BCA covers aspects of building such as structure, fire resistance, access and egress, fire fighting equipment, mechanical ventilation and certain aspects of health and amenity.

The requirements for compliance with the BCA are based on the Class of the building. The classification of the building is determined by the purpose for which it is adapted to be used. Where parts of the building have different purposes, each part of the building must be classified separately.

Where compliance with the BCA may compromise the architectural integrity of the building and diminish its cultural significance, dispensation may be sought through the Fire Advisory Panel of the Heritage Council. The BCA does not necessarily apply to existing buildings and discretion may be used in its application to existing buildings.

6.4.2 Other Relevant Legislation

Other legislation may apply to the building depending on the activities, uses and level and type of public access proposed. This could include requirements relating to occupational health and safety, provision for disabled access and services and commercial catering.

6.5 IMPLICATIONS OF EXISTING CONDITION.

The Eveleigh Locomotive Workshops where adapted for new use in 1996. This included upgrading of service, stormwater drainage, etc as well as the construction of mezzanines, etc. Similarly there has been a new mezzanine added in bay 15 (old Bay 14) in 2002. Some of the historic fabric was conserved at this time, in particular the east wall and the windows and doors. Though the new electrical services meet office needs they are no longer adequate for industrial use. Thus the power supply is not suitable for the operation of the cranes. If these and other historic machinery are to be operated in the future the electricity supply needs upgrading.

All this new work is generally in good condition and should be cared for by regular maintenance. However, many of the building conservation issues were not addressed at this time. The clear sheeting to the lantern roofs was installed with fixings into the historic existing roof joists. These are now deteriorated and the sheeting is working loose. An ingenious fixing method has been devised by the SHFA maintenance staff that maximises retention of existing fabric but in the long term there may have to be more extensive replacement of structural members. This would be an opportunity to return to the original pattern of roof glazing ie. solid sheeting over the lanterns.

The major items not addressed in 1996 were the conservation of the north, west and south facades. Documentation of masonry repairs was subsequently prepared for this work but it was not carried out. These works include repairs to the sandstone cornice and coping. If not addressed, these items may result in deteriorated overhanging stone falling to the ground. It is understood that a 'makesafe' has been carried out in order to remove loose and dangerous stone. If the repair work is not done the overhanging cornice should be inspected biannually to remove loose stone, so minimising public risk.

In the long term if the repairs are not done there will be increased water entry to the building and associated deterioration of the brickwork and any embedded metal items.

Some of the historic services and roof details were covered, bypassed or removed during the adaptive reuse process. The louvre sides to the roof lanterns were covered during the 1996 works. These are significant fabric and should be conserved in the long term. As access is now restricted this would be appropriate to do when works are necessary to the new sheeting. The only original roof lights were removed from Bay 16 (old Bay 15) roof in 1996. There are good records of these and a sample of this roof light configuration should be reproduced for interpretation in the future. It would be appropriate to do this in conjunction with future roof maintenance in Bays 1 and/or 2.

Services such as the stormwater drains were bypassed during the adaptive reuse. Though no longer in use they should be retained. This means that in any excavation planners and contractors should be aware of the need to retain historic services. The bypassing of some stormwater services means that some areas are not properly drained. This includes the pit under the steam boilers in Annex 4. This area should be drained as soon as possible by clearing the old drains or installing new drainage.

Throughout the building, except Bays 1 & 2, there has been a new concrete slab laid covering the existing rails. This was done to provide an even surface and to ensure better stormwater drainage. The slab is carpeted contrary to recommendations that industrial floor finishes should be used. The slab was designed so that in the future the carpet could be removed and the surface revealed and if desired polished to result in a more appropriate finish. When the existing carpet reaches the end of its life returning to a more appropriate finish should be considered. The carpet ‘remembers’ the rails in stripes in the pattern. In the long term better interpretation of the rails is desirable including exposing the original rails in some areas.

The brickwork in the gables of Bays 1-4 poses some risk due to cracks on the bedding planes. They may be unstable in case of earthquake. No detailed assessment of the buildings stability in case of earthquake has been undertaken and it is recommended that this be done with particular attention to the gable brickwork in Bays 1-4. The brickwork should be structurally stabilised and repaired.

6.6 SITE OWNERSHIP AND MANAGEMENT

6.6.1 The Sydney Harbour Foreshore Authority

The Sydney Harbour Foreshore Authority (SHFA) assumed control of the Eveleigh Locomotive Workshops building as part of the Master Planning area from the City West Development Corporation (CWDC) in August 2000. The building had been transferred to the CWDC from the SRA in March 1995.

SHFA is a statutory corporation set up under the Sydney Harbour Foreshore Authority Act 1998 as the body responsible:

- To protect and enhance the natural and cultural heritage of Sydney's inner harbour foreshore
- To promote, co-ordinate, manage, undertake and secure the orderly and economic development and use of the foreshore area, including the provision of infrastructure, and
- To develop and implement cultural, educational, commercial, tourist, recreational, entertainment and transport activities and facilities.

The Act enables the Authority to exercise its functions on lands outside the foreshore area.

The Sydney Harbour Foreshore Authority Act repealed the Sydney Cove Redevelopment Act 1968 and the Darling Harbour Authority Act 1984 and dissolved the City West Development Corporation as well as the Sydney Cove Redevelopment Authority and the Darling Harbour Authority.

The Authority is answerable to the Minister for Planning to whom it submits annual reports. The Board of the Authority consists of the Chief Executive Officer, the Director-General of PlanningNSW and up to 5 persons appointed by the Minister. The Minister appoints a member of the Board as the Chairperson of the Board. The current SHFA Board members are:

- Gerry Gleeson (Chairman)
- Sue Holliday (Director-General, PlanningNSW)
- Jon Isaacs
- Penny Morris
- Greg Robinson (CEO SHFA)
- Frank Sartor (Lord Mayor of Sydney)
- Helen Wright

The SHFA Vision is *to continually improve Sydney's significant waterfront precincts, balancing visitor, community and commercial expectations.*

The SHFA Charter aims to:

- Add value by redevelopment of surplus government land through a highly skilled organisation that creates new city precincts on the harbour
- Capitalise on the economic and cultural worth of foreshore precincts, notably The Rocks, Circular Quay, Darling Harbour as core attractions for both visitors and Sydneysiders
- Balance economic return, vibrancy and diversity of harbour foreshores, including the working waterfront
- Deliver excellence in its role as place manager for Sydney's premier harbour sites
- As custodian ensure preservation and interpretation of natural and cultural heritage around the foreshores, promoting a sense of community ownership
- Facilitate the opening up of foreshore areas to the public, balancing protection with active use while improving and extending waterfront public domain.

6.6.2 Australian Technology Park Precinct Management PTY LTD

SHFA assumed control of the ATP through its fully owned subsidiary Australian Technology Park Sydney Limited. This corporation later changed its name to the Australian Technology Park Precinct Management Ltd (ATPPM). ATPPM is an operating company of SHFA, and manages the commercial and financial aspects of the Australian Technology Park. It is responsible for the day to day management of the Park, its strategic development, its master plan and the conservation of its heritage.

The ATP (and Master Plan 2001) Vision Statement is *to establish an internationally recognised, world class technology and business centre aimed at building global competitiveness in key growth sectors of the economy.*

Elements of this Vision which relate to heritage include:
- Adaptive reuse and interpretation of the original railway use buildings and elements which are of heritage significance and show the historical uses of technology
- The establishment of uses on the site that do not detrimentally impact on the historic, social, economic, natural or built environments of the locality.

The ATPPM Board has the same membership as the SHFA Board. The Board meets monthly.

An ATP Audit & Risk Management Committee was set up in June 2001. It comprises:

- Jon Isaacs – Director
- Penny Morris – Director
- Dianne Patenall - Minister's Representative
- Greg Robinson – Managing Director.

The Audit & Risk Management Committee meetings are also attended by representatives from SHFA's finance unit, the General Manager of ATPPM, the NSW Audit Office and Deloitte Touche Tohmatsu's internal audit unit.

An ATP Advisory Council has also been established, bringing together a group of highly regarded business and technical experts to advise the ATP Board and provide advice to management on a wide range of issues. The Council's Chair is Mr John Conde AO, and includes State, university and industry representation. It meets bi-monthly.

Development and uses of the Workshops must be economically viable, supporting commercially sustainable activity, while recognising and reflecting heritage issues in line with the SHFA Charter.

6.6.3 ATP Development to Date

Since 2000, when SHFA took over the site from CWDC, there have only been minor changes to the Locomotive Workshop building. Recently, SHFA has developed a scheme for fit out for offices in Bay 15, and a new fit out has just been completed for the ATPPM offices at first floor level in Bay 8. A scheme for the appropriate placement of the railway machinery in Bays 1-2 is being finalised, with individual pieces being located as much as possible in the bays where they were originally located.

The ATP has 40,000 sq m of incubator, laboratory and commercial floorspace, with a further 100,000 sq m which will be developed over the next ten years.

The Locomotive Workshop contains technology tenancies mainly based around information and communication technology (ICT). The Locomotive Workshop as part of the ATP has strong functional links with other buildings in the Master Plan area, as described briefly following.

The **National Innovation Centre** (formerly the New Loco Shop or the New Engine Shop) is on lease to the Universities for 94 years. It houses the administrative offices of ATP Innovations and several leading research centres and university businesses. The lease comprises 6000 sq m of floor space. It uses half of the Locomotive Workshops as tenancy space, running the incubator program, providing business support, ie mentoring, contact with solicitors, venture capital, etc. ATP Innovations manages the Business Incubator Program and promotes the research and development interests of its universities. The incubator program nurtures small start-up companies, which, when they become established, can take up a larger space within the Locomotive Workshop and the ATP.

The **International Business Centre** (formerly the Timekeepers and Works Manager's Office) functions as an incubator for larger companies, and was on a one-year lease. SHFA is to take over the space from the Universities. The ATP commenced with the involvement of the University of New South Wales, the University of Sydney and the University of Technology. Since then, the Australian National University has joined the venture partners. The IBC will shortly be relocated into the NIC and ATPPM will manage the building directly, with small technology companies as tenants, and will maintain existing arrangements. Between 5-10 small companies are envisaged to be located in the building. The building is to be refurbished in the near future, with an upgrade in services and appearance.

Other large companies on the site, in the Biomedical Building anchored by Johnson & Johnson and the RTA Traffic Management Centre, have strong links with some of the smaller technology companies in the Workshop.

A *Deed of Licence* has been developed by ATPPM containing standard conditions for all tenancies. A requirement to obtain approval for all works carried out is included. There is also a relocation clause enabling ATPPM to relocate tenants within the building or elsewhere on the ATP.

ATPPM has developed a document *Report on the Selection Criteria Used to Evaluate Incoming Tenancies* dated March 2002 which will assist in maintaining the emphasis on technology and the desired mix and balance of synergies and activities when assessing prospective tenants.

There are currently approximately 30 tenants. The spaces are let out on the basis of licences, with a time frame of 2-5 years. A plan of the current uses is provided in Appendix C. Current and proposed uses of Bays 1–16 (formerly Bays 1-15, including Bay 4a) are described briefly below.

6.6.5 Current Uses, Constraints & Opportunities

The 1995 Conservation Management Plan recommended the retention of Bays 1 – 4 as a machinery workshop/ museum. Another recommendation was for less subdivision was of the other bays than has already taken place. Now only Bays 10 – 14 (old Bays 9 – 13) remain completely open. Internal planning of the new work in Bay 8 (old Bay 7) has ensured that it remains relatively open and reflects its historic use as a traverser bay. Planning has also retained Row 8 as a circulation spine in accord with the 1995 recommendations. Historically this became a more important circulation route when the traverser in Bay 14 (old Bay 13) was moved outside and that in Bay 8 (old Bay 7) was removed.

It is important to retain the sense of space wherein the machinery was used and duties performed without the place being cramped. A sense of space does not mean emptiness, rather that the dimensions of the building and the “largeness” of the railway activities can be appreciated.

Overall, there should be no further subdivision of the remaining large open spaces with full height walls dividing bays or rows nor any further large scale mezzanines. The bays that have been left open and circulation routes that have been established in accord with the 1995 Conservation Management Plan should be retained in any future further development. Single storey installations, on a rectilinear grid, can be added as historically these spaces were not empty but housed machinery, pits etc.

BAYS 1 & 2
Formerly the Blacksmith's and Steam Hammer Shops.

CURRENT USES
Bays 1-2 South:
- This space is currently licensed for use as a working Blacksmith's Shop and is let out to Wrought Artworks, a modern day blacksmithing enterprise specialising in heritage ironworks and conservation. Any machinery not related to that use and not originally located in these bays, is currently being removed from this area.

Bays 1-2 North:
- Railway machinery from around the site has been placed here. Machinery not relating to this area is currently being moved. Remediation of the sand and soil will follow. Some of that machinery is currently being cleaned and restored. The original machinery in these bays includes the 1800 ton Davy Steam Press. ATPPM is looking for a suitable tenant for the area.
- The railway machinery in Bays 1-2 and in other locations on the site is currently still owned by the State Rail Authority.

CONSTRAINTS
- Bays 1 & 2 are the only bays in the ATP in which industrial uses have been retained thus continuing industrial use and interpretation of the place as a workshop is paramount in these bays.
- The preferred use is associated with railway function and/or utilising the original furnaces, forges and presses such as a blacksmith's workshop
- It is important to retain the open spaces of the workshops to facilitate use and allow appreciation of the space. Therefore there should be no intrusive subdivision of the bays.
- Health and safety issues associated with operating heavy machinery in public spaces.
- The operation of the Davy Press creates severe vibrations and noise that will potentially disturb adjacent tenants. These activities need coordination to avoid conflicts and physical measures such as sound proofing may be appropriate.

OPPORTUNITIES
- Further expansion of commercial industrial uses.
- Ideal uses are trade schools associated with TAFE or leisure activities such Sydney Community College trade courses.
- Restoration of cranes to operate to enhance workshop use and for the building's interpretation.

- Main interpretation point for the industrial activities in the Eveleigh Railway Complex.
- Use for interpretive events.
- Restoration of roof lights and roof monitor details.
- Use associated with steam locomotive restoration.
- Use associated with building conservation eg. making cast iron window frames.

BAYS 3 – 5

Formerly Bays 3, 4 & 4a. Originally the Workshop's Boiler Shop and Foundry.

CURRENT USES

Bays 3 – 5 North

- The bays were leased to the Sydney Conservatorium of Music as temporary accommodation. The fitout contains soundproofed rooms and the wall between Bays 2 & 3 is designed to reduce sound transmission. Since late 2001, the NSW Department of Education and Training, including the Performing Arts Unit and TAFE, has occupied the first floor. The bays have been identified as the proposed site for a technology high school, the School of the Future. A number of ground floor suites have been earmarked by ATPPM for temporary occupation by smaller technology companies.

Bays 3-5 South

- These bays house the ATP Conference Centre. A facility include a 500-seat theatre, a dining room seating up to 520 guests, a conference centre and uses the Exhibition Hall in Bays 10-14.

CONSTRAINTS (3 –5 north & south)

The existing fitouts:

- These bays have timber piled footings under column and walls that should be monitored for movement (some have been underpinned)
- Detract from the ability to appreciate the former large space
- Conceal potential interpretability of the building
- Are conventional office arrangements imposed within a rare space
- Noise transmitted from the adjacent workshops in Bays 1 & 2 may interfere with use of these bays.

OPPORTUNITIES

- Uses that allow for industrial activities in adjoining workshop (Bays 1 & 2) should be selected
- As the north bays are soundproofed, use the existing fitout to house specialist or selective schools that focus on performance such as the Newtown School of Performing Arts and/or activities that have noise as a by-product.
- Restore the sense of space by the introduction of transparent walls or the future removal of walls
- Potential for interpretation during maintenance or renovations
- Interpretation of Bay 5 as the former Bay 4a and of the subsurface remains of the Tin and Coppersmith's areas.
- Conservation and interpretation of the steam pumps in the southern annex and on the south side of the hydraulic accumulators.
- Display the lottery ticket "mural" in Bay 4 South (where it came from).

BAYS 6 & 7 & 9

Formerly Bays 5 & 6 & 8. Originally, these bays contained the Engine Repair Shop.

CURRENT USES

- A number of small IT based enterprises are located in these bays. They are generally small firms except for Fuji Xerox, which has a 4-year lease expiring at the end of 2002, the Advanced Manufacturing Centre and the TAFE NSW Industrial Partnership Centre.

CONSTRAINTS

The existing fitouts:

- Detract from the ability to appreciate the former large space although Bays 6 & 7 are the most appropriate for infilling as they are adjacent to the former external east brick wall.
- Conceal potential interpretability of the building
- Are conventional office arrangements imposed within a rare space

OPPORTUNITIES

- Restore or improve the sense of space by introduction of some transparent walls (especially in Bay 9)
- Potential for interpretation during maintenance or renovations
- Reveal and interpret former external brick wall at east of Bay 6 (former Bay 5)

- Interpret former canteen and pit locations
- Display historic plans on fitout walls lining the central row.
- Excavate and display the pit on the south side of the central row and its former link to the traverser.

BAY 8
Formerly Bay 7. Originally the traverser bay.

CURRENT USES
• The administrative and social heart of the ATP is located here. The offices of ATP Precinct Management and Conference Centre are located in an open atrium form on the first floor, with a café at ground floor level. The bay also includes a cooperative research centre and provides the locus for the Park's social events, a major entry point to the ATP and a north south through route.

CONSTRAINTS
- Current fitout has concealed fundamental interpretive elements, of particular note, carpet has been laid over the concrete floor which has been laid over the traverser and central rails
- Current roofing is not representative of its historical configuration
- Bays should remain open and have no further mezzanines as with the former traverser bay.

OPPORTUNITIES
- Excavate in part, the traverser pit and rails that are still *in situ* by removing the carpet and overlaid concrete.
- Removal of carpet and polishing the concrete floor slab or laying an alternative cover as a more appropriate floor finish, ie, industrial in character
- Exposing and interpreting rails in central row or inserting metal strips in the concrete floor in former rail locations (this applies to the central row in Bays 3 – 16 [former Bays 3 – 15])
- Exhibit and interpret appropriate machinery within the open space and aisle. Eg. The current Bay 8 historically had the traverser operating within it. Exhibit and interpret the traverser in the aisle of Bay 8 so that its association with the pits in adjacent bays.
- Visually or physically opening up some of the north wall, ie, the rail end of the traverser to link the building to the main railway line
- The roof can be restored to its original configuration during maintenance and repair and be visible to users

BAYS 10 – 14

Formerly Bays 9- 13. Originally the machine & fitting shop, with the tool room/air brakes added in the former Bays 13 – 14.

CURRENT USES

- These bays are currently under the management and control of the ATP Conference Centre, used as an Exhibition Hall. The space is let out for large events such as conferences, advertising and commercials, movies, balls, fashion shows, exhibitions, etc.

Bay 10 North

- The railway machinery restored in Bays 1-2 are to be exhibited here.

Bays 10-14 North

- ATPPM and Questacon are currently negotiating the use of these bays as a science/technology exhibition space. Exhibitions will be approximately one storey in height so that the scale of the space in these bays can still be appreciated. Twelve separate exhibits are proposed, with an anticipated visitation of 1,000 students per day.

Bays 10-14 South

- will be retained by the ATP Conference Centre continuing the current uses as described above.

CONSTRAINTS

- Avoid using large, obtrusive partitions to divide space.
- Retain levels to one storey.
- Avoid adding new mezzanines.
- Avoid impacting the original (authentic) building fabric.

OPPORTUNITIES

- Maintain all or part of Bays 10 –14 for large-scale events such as exhibitions, balls, fashion shows, markets, launches, filming and other uses that require large spaces and that do not impact on the fabric such as HSC marking.
- Use as a convention centre.
- Provide small spaces using demountables, “demountable” style offices or temporary structures. The use of such buildings within the building has historical precedents and is an appropriate visual interpretation of the bays.
- Consider using free-standing displays on platforms such as at the Royal Easter Show.
- Future alternative use for sporting events or facilities, theatre, industry or other compatible use.

- Future restoration of roof lights to original configuration to improve light levels
- Subdivision of the space at ground level on a rectilinear grid reflecting the layout when in railway use
- Interpretation of the former traverser in Bay 14 and pits in Bay 13
- Visually or physically opening up some of the north wall, ie, the rail end of the traverser to link the building to the main railway line
- Conserving and making operational one or more of the cranes to serve a potential alternative use or in association with the machinery display in Bay 10
- Restore countershaft girders generally, or in association with Bay 10. Display and use to support services or installations
- Install interpretive display in Bay 10 about the operation of the line shafts and belt-driven machinery.

BAY 15

Formerly Bay 14. Pattern & Joinery Shop, it later became the Carpenter's Shop, and Tool Room.

CURRENT USES

- This bay has been being fitted out by ATPPM to provide 2500 sq m of office space over 3 levels. The work was completed at Easter 2002. It will enable east-west access through the length of the Locomotive Workshop along the cental row, allowing stronger links to be forged between business enterprises in the building.

CONSTRAINTS

- The brick walls on each side of the bay must be conserved and should not have new openings made in them
- Avoid further enclosure that would mask original fabric and structure.

OPPORTUNITIES

- The bay should be a whole separate tenancy or function as it has brick walls on both sides.
- This is an appropriate bay for mezzanines and subdivision as it was divided from the other bays by walls on either side and was always a smaller "contained" space.
- The space could have future use requiring noise separation or security provided by the brick walls
- The fitout may be altered in the future to suit user requirements
- Interpret how the original function required separation from the main body of the workshop.

BAY 16

Formerly Bay 15. The bay was originally a loco store, then a Millrights Workshop after which it became the Rail Motor Test Room/Store and has an early mezzanine in the south part of the bay.

CURRENT USES

- It now houses a cluster of start-up technology companies.

CONSTRAINTS

The existing fitout in the north end of the bay:

- Detracts from ability to appreciate the space and its difference to more open bays.
- Conceals potential interpretability of the building
- The south mezzanine should be retained
- The brick walls on each side of the bay must be conserved and should not have new openings made in them.

OPPORTUNITIES

- Restore the sense of space and potential for interpretation during maintenance or renovations.
- This is an appropriate bay for mezzanines and subdivision as it was divided from the other bays by walls on either side and was always a smaller space.
- The bay should be a whole separate tenancy or function as it has brick walls on both sides.
- The space could have future use requiring noise separation or security provided by the brick walls
- Interpret how the original function required separation from the main body of the workshop.
- Interpret the link to the external traverser road to the west of this bay and the link to the more open bays via the central row.
- Interpret the early mezzanine and how windows were added.

ANNEXES

Annexes have been used historically to house services. The adaptation for the ATP retained historic annexes and housed services in new annexes in accordance with the 1995 Conservation Management Plan.

CURRENT USES

- Historic annexes house machinery, boilers and compressors adjacent to Bays 1 – 3. The historic annexes adjacent to Bays 9 & 10 now house offices. Modern annexes house building services.

CONSTRAINTS

- Historic annexes must be conserved
- Traverser bays (8 & 14, former 7 & 13) must not be obscured by annexes
- Turning circles of trucks which need access to Bays 10 – 14 may limit the location of new annexes.

OPPORTUNITIES

- New annexes may be added to house services and should continue the design theme of those added for the ATP
- Historic annexes with machinery can be conserved and interpreted with separate access or viewing from the exterior of the building
- Historic annexes that are now offices may be used for other purposes eg, service provision, plant rooms etc.

6.6.6 Development Application Process

The Minister for Planning is the consent authority for development applications (DAs) in the Master Plan area. The DA process is set out briefly below:

Pre-DA Discussion and Advice:

- Obtain Pre-DA advice from SHFA and PlanningNSW.
- Outline proposal discussed at monthly liaison meeting between SHFA and PlanningNSW. Any relevant concerns should be conveyed to applicant to be addressed in DA.
- Consultation with Heritage Office advisable at this stage.
- SHFA consent as owner is required for DA lodgement.
- Applicant to identify any potential heritage or environmental effects and determine ways to enhance or alleviate these.
- Heritage effects must be addressed in a Statement of Heritage Impact and submitted with DA.

- Archaeological impacts must be addressed by preparing an archaeological assessment for any proposal which may affect archaeological relics in the Workshop area.
- Environmental effects, if any should be addressed in the DA, incorporating information on any mitigation measures to be incorporated into the proposal.
- Heritage Council Section 60 approval may be obtained pre lodgement of DA.
- The DA should be submitted to Planning NSW accompanied by supporting information and the appropriate fee.

Consideration following submission of DA:

- Planning NSW considers DA and requests further information if required.
- Referral of DA to Heritage Office for consideration of heritage impacts under Heritage Act.
- Referral of DA to SHFA (if lodged by another body), the SRA and South Sydney Council for consultation as required under SREP 26.
- If PlanningNSW considers it to be warranted, advertise and place DA on public exhibition for 21 days.
- Heritage Council Section 60 approval received with conditions.
- Planning NSW and SHFA discuss draft conditions.
- Assessment and reporting of proposal by SHFA.
- Proposal and views of other authorities considered by the SHFA Project Control Group.
- Consent issued/refused by PlanningNSW with conditions.

6.7 DESIGN PRINCIPLES FOR NEW WORK

INTRODUCTION

Between 1995 and 2002 bays 3-9 and bays 15-16 were refurbished in order to accommodate tenants. The work has impacted on the visual comprehension of the space and the potential for interpretation of these bays in the Locomotive Workshop.

Bays 1-2 and 10-14 are the only remaining bays of an open nature and it is strongly recommended that they remain as open bays.

The design principles in this section of the Conservation Management Plan seek to retain the open nature of bays 1-2 and 10-14 and facilitate interpretation. Some design principles address the fitouts in bays 3-9 and bays 15-16 with a view to recovering significance and facilitate further interpretation.

MUSEE D'ORSAY, INSERTION OF NEW ELEMENTS IN THE INTERIOR SPACE

In Paris a former railway station has been converted to a fine art museum. In the Musee d'Orsay exhibition rooms have been built within the space for the display of artworks and the 'terraces' over them are used for the display of sculpture. These are linked with other rooms on the same level. The use of single storey 'boxes' allows the viewing of the building itself and maintains views and vistas throughout the building.

APPLICATION AT EVELEIGH

The use of single story 'boxes' for display rooms or offices with a terrace space over has many applications at Eveleigh. They can be designed in the same way as the traditional railway 'portable' that was used during the railway use of the building for offices or enclosed rooms as required. The design principles for these structures are that they have a portable appearance and that they appear that they can be relocated without much effort. A contemporary interpretation of the rail portable could be used rather than a literal version and be designed as a self-contained unit with no fixings to the floor. They could be designed to be relocatable with cranes or have wheels on a trolley base.

This principle could be used for the proposed Questacon exhibition, or for any future exhibition or gallery space where the 'box' can provide its own security. The top of the box could be used for the additional display for Questacon or other exhibitions. Access to the upper level could be by steel stairs, possibly moveable like aircraft stairs.

It is also applicable for a future interpretation/ orientation centre or for temporary exhibition displays that could occur in the exhibition space.

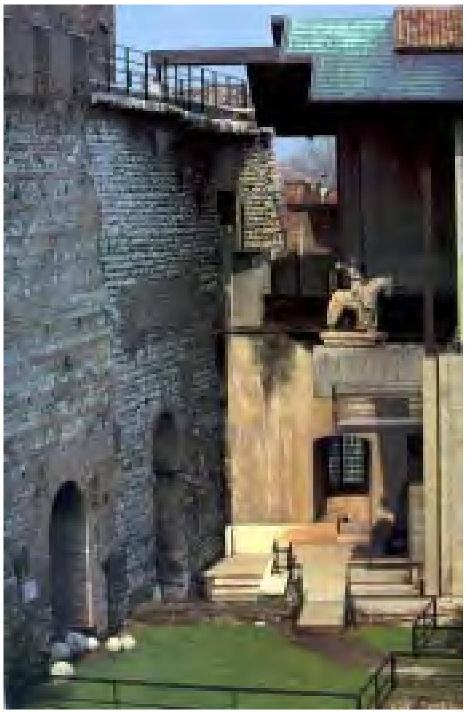
DESIGNS PRINCIPLES FOR BAYS 1 & 2

1. Fencing between the Blacksmithing areas and the public access way in Row 8 should be designed to be:
- transparent
- sympathetic to the character of the Locomotive workshop
- a contemporary interpretation of the industrial/ engineering aspects of the building without being a fashionable design statement (which dates quickly) as, for example, at Castlevechio at Verona.

2. Elevated walkways should:
- use steel with thin sections
- be transparent
- be sympathetic to the industrial/engineering aspects of the Locomotive workshops and may reinterpret machinery and industrial aspects of relevant railway technology
- be located and fixed with regard to the heritage significance of the building as, for example, at Castlevechio at Verona.

3. Where small spaces are required within bays e.g. for an interpretation centre, orientation centre or/ blacksmith's office they should be:
- lightweight and portable in appearance with a design derived from the traditional portable "rooms" used at Eveleigh for offices.
- a contemporary interpretation of a lightweight portable space as, for example, at the Musee d'Orsay.

An interpretation centre could incorporate graphic and written interpretive material about Bays 1&2. The potential for interpreting the whole of the Locomotive Workshop building or even the entire site, is high.



CASTLEVECHIO MUSEUM, VERONA, ITALY, ELEVATED WALKWAYS
The photograph shows elevated walkways constructed of fine steel sections and detailed in a contemporary manner. A closed balustrade treatment or semi transparent metal mesh is shown on the upper walkway and an open balustrade treatment is shown on the lower walkway. Dark neutral colours have been used to make the additions recessive.

APPLICATION AT EVELEIGH
At Eveleigh this treatment is suitable for elevated walkways in bays 1 & 2 for balustrades in tenancy fitouts, and the safety fence in bays 1 & 2.

DESIGN PRINCIPLES BAYS 3-9 & BAYS 15-16 FOR THE RECOVERY OF THE SIGNIFICANCE

The fitouts in these bays include many small rooms and currently use a majority of solid materials. They are of a ubiquitous design, and don't respond to their context in the Locomotive Workshop. They adversely affect views and vistas of the interior spaces. The detailing of the stairs, handrails and elevated walkways in Bays 3 – 9 responds well to the industrial character. Principles for future work and alterations follow:

- Reduction of the amount of full height solid partitioning and enclosure
- use of transparent materials such as glass with expressed steel frames to replace plasterboard walls where practical
- Introduction of a hierarchy of materials which are solid on the ground floor level and transparent on higher levels
- Reconfiguration of fitouts to open up spaces and increase views and vistas of the interior spaces, as for example at the Kestner society
- Use of colour complementary to the character of the building. This includes greys, browns and creams but also splashes of bright colours such as the oranges, reds and yellows traditionally used for machinery, warning signs, fire equipment, etc..
- Floor coverings should reflect the industrial nature of the building. When the carpet is worn the concrete could be polished or new floor covering layed. Suitable materials are rubber sheet or tile, or sheet material in linoleum or vinyl
- Further interpretation of the building in these bays for example: Interpretation of rails by metal strips in flooring and written material as part of the floor surface; transparent sections of floor revealing rails, pits or archaeology; the reintroduction of machinery, and display material on the walls.

THE KESTNER SOCIETY, HAMBURG
The Kestner Society Hamburg (Heinz Thiel in Hannover Journal, No 2, 1999 p: 52-55) uses modern glass detailing between historic buildings. Internally it has a gallery, which adaptively reuses half of the Goseriade Swimming baths (constructed in 1905).

The design principle that can be distilled from the adaptive work on this building is the use of vertical space. Galleries run around the walls leaving the majority of the volume of the former women's swimming baths as an open space. The new constructional elements, have been inserted visibly into the old shell. A photograph shows the construction of the new 'wall' parallel but detached from the existing walls.

APPLICATION AT EVELEIGH
These design principals have application at Eveleigh as an alternative approach to office fitouts in the bays which already have this use. The example uses the vertical space, rather than horizontal levels filling the whole bays. This could help achieve the conservation policies, which state that the open character of the bays, and views and vistas should be retained. This approach could be explored using transparent materials on a steel grid.

DESIGN PRINCIPLES BAYS 10-14

The overriding principal is to retain the open character of these bays as was done, for example, at the Musee d'Orsay. The use should maintain north south vistas, east west vistas and diagonal vistas. The girders that were removed from here should be reinstated in whole or in part. Design Principles for a semi permanent exhibition space or gallery or other use of the space follow:

- the exhibition space should not be conceived as a traditional office fitout
- elements should not generally be more than one storey, though occasional elements could be taller
- elements should be freestanding moveable platforms and be perceived as objects in the space. Note the historic use of the space always had objects in it.
- use of the upper level of elements as an open display terrace or walkway
- self secured exhibitions
- design elements using the rectilinear grid used when the place was a railway workshop
- use of tower roof elements as in Bay 3 (or 4) to accommodate some tall installation and possibly to offer high level views of the outside
- no full height separation through the use of screens or walls from the other uses of bays 10-14 and the use of transparent screens where possible

If secure spaces are required within the larger spaces this can be achieved by securing each small space rather than the entire space. Priciples follow:

- provide secure exhibition spaces by using traditional railway offices. Railway huts are moveable offices and they are enclosed so security requirements are fulfilled.
- explore the design of a contemporary transparent version of the railway portable
- Use locking exhibition cases in open areas

DESIGN PRINCIPLES FOR ROW 8 IN BAYS 15 & 16

There should be no separation or barriers defining access. Movement along the central road for the whole building should be allowed/encouraged.

FORMER SEWAGE WORKS, BOSTON, MASSACHUSETTS
INSERTION OF NEW ELEMENTS IN THE INTERIOR SPACE
The photograph shows a free standing office inserted within the volume of the historic building. The fitout has retained the sense of openness while providing offices and conference rooms. The old pump in the foreground is a focal point in the space. Source: Richter Greer, 1998: 134, 135.

APPLICATION AT EVELEIGH
The use of single story 'boxes' for display rooms or offices has many applications at Eveleigh. A contemporary interpretation of the rail portable could be used and be designed as a self-contained unit.

This principle could be used for the proposed Questacon exhibition, or for any future exhibition or gallery space where the 'box' can provide its own security. It is also applicable for a future interpretation/ orientation centre or for temporary exhibition displays that could occur in the exhibition space.

MUSEE D'ORSAY, GLASS FLOOR
The example illustrated is from the Musee d'Orsay, Paris, France by Gae Aulenti which is a former railway terminal converted to a new use. It shows a trafficable glass floor on a steel frame. It is used to display a model of Paris which provides the context for the Musee d'Orsay. It is trafficable and provides the observer with a bird's eye plan view. On the rear wall shown in the photograph there is a model showing the Musee d'Orsay in cross section.

APPLICATION AT EVELEIGH
This example could be applied at Eveleigh as an interpretive device. This design can be used to reveal pits, rails and archaeology. Items to be interpreted could be excavated and then covered with a glass floor to allow viewing. A context model could also be located in the Locomotive Workshops building. It could provide the interpretation of either the whole of the Locomotive Workshop, its site or the entire Eveleigh Railway Yard. This interpretive device could be located near a main entry point or as part of an orientation centre suggested for Bays 1 & 2. It could be placed in the public walkway in Bay 8 or in Row 8 of Bays 1 & 2,

CASTLEVECHIO MUSEUM, VERONA, ITALY,
ENTRANCE DETAILING
This photograph shows the use of steel and glass with contemporary detailing. It also shows the hierarchy of solid materials at ground floor with glass above suggested for Eveleigh tenancies.

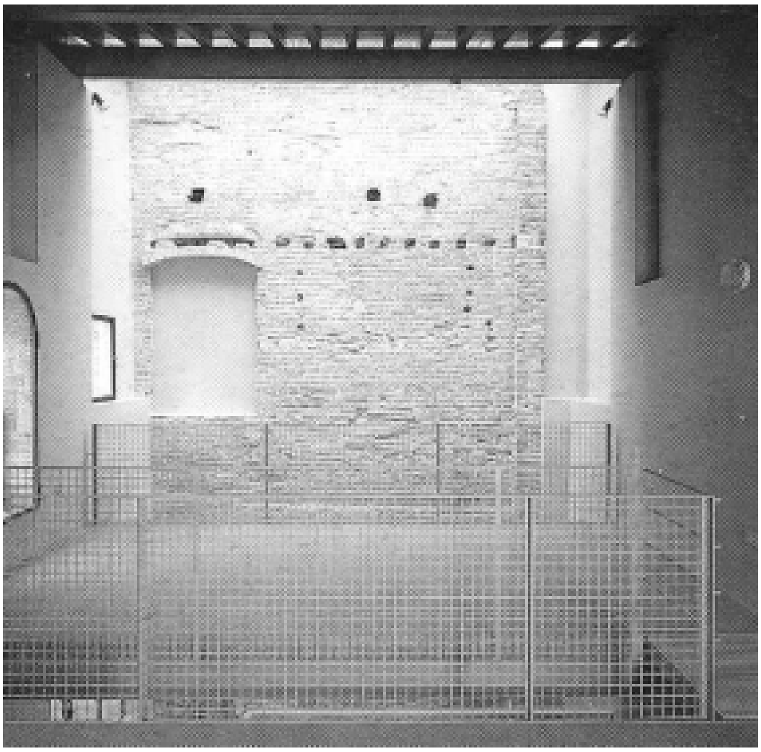
VISITOR CENTRE, CHARLESTOWN, SOUTH CAROLINA, USA
ADAPTIVE RE-USE
The photographs show the adaptive re-use of former railroad buildings. The timber structure has modern facade treatment which is sympathetic to the character of the building. It functions as an open bus shed.

APPLICATION AT EVELEIGH
At Eveleigh this treatment is suitable for parts of the Blacksmiths' Workshop and the Timber Shed Extension.

QUERINI-STAMPALIA FOUNDATION, VENICE, ITALY,
MODERN ELEMENTS IN HISTORIC BUILDING
The illustrations show the uncompromisingly modern treatment of new elements introduced in the conversion of this structure for exhibitions and conferences. Though modern the treatment does not dominate the historic structure

APPLICATION AT EVELEIGH
At Eveleigh this treatment provides a model for the style of new work.

OLIVETTI SHOWROOM, MILAN ITALY by CARLO SCARPA
These photographs show the use of transparent and semi transparent metal materials detailed in a contemporary manner. This treatment has been recommended for tenancy fitouts at Eveleigh.

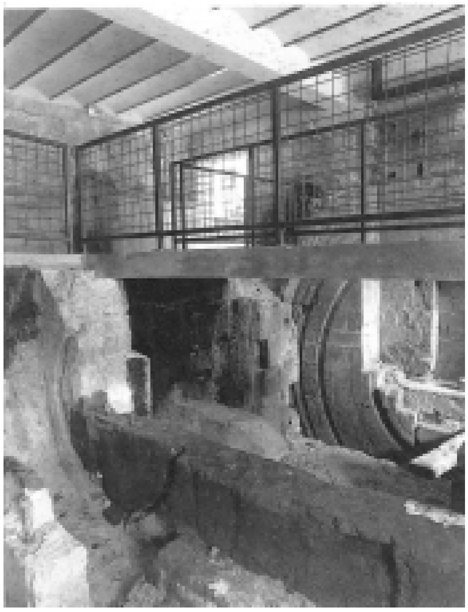


EXHIBITION ROOMS, PISA, ITALY,
ELEVATED WALKWAYS, OLD & NEW

This former medieval palace was converted by architect, Massimo Carmassi into exhibition rooms and an audio visual centre. His work aims to expose traces of work carried out throughout history without undue preference to any period. Traces of alterations over time have been deliberately displayed and new circulation bridges provided, running clear of the old walls. The balustrades are detailed as modern metal installations of unobtrusive elegance. Source: Robert, p. 15-17.

APPLICATION AT EVELEIGH

At Eveleigh this treatment is suitable for elevated walkways in bays 1 & 2 for balustrades in tenancy fitouts, and the safety fence in bays 1 & 2. It also provides another model for the display of archaeological remains within a space.



ARTS CENTRE, NANTES, FRANCE, MINIMUM INTERVENTION

The former chocolate factory in the Loire Valley was converted into an arts centre. The philosophy was of transformation with minimal intervention and a deliberately crude conversion. The main new addition is a theatre which is likewise 'unfinished'. Source: World Architecture, Issue 95, April 2001, Tower publishing.

APPLICATION AT EVELEIGH

At Eveleigh this treatment provides a model for minimising impact and for not cleaning the place up too much.

7.0 CONSERVATION POLICIES

7.1 INTRODUCTION

The policies in this document include policies from the Conservation Management Plan for the Eveleigh Locomotive Workshops by DPWS June 1995. Some of the original policies have been modified and new policies have been added to reflect the revised Statement of Significance and the change and development that has occurred since 1995.

These policies are part of the revised Conservation Management Plan for the Eveleigh Locomotive Workshops in particular, and also include general policies relating to the whole of the Eveleigh Railway Yards. They arise out of the significance of the Locomotive Workshops site as well as the significance of the place in combination with the Eveleigh Carriage Workshops. The policies should be used to guide decision making and development and are based on the principles of the Burra Charter of ICOMOS Australia (1999).

POLICIES TABLE OF CONTENTS

7.2 POLICIES SUMMARY

GENERAL POLICIES

1 IMPLEMENTATION & MANAGEMENT

1.1 Set up management structures and identify individuals to manage and execute conservation of the place and its contents.

1.2 Adopt approach in accordance with the philosophies of "The Conservation Plan" (Kerr 1999) and the Australian ICOMOS Burra Charter (1999).

1.3 Apply this Conservation Management Plan and associated information when undertaking conservation and development works.

2 CONSERVING THE FABRIC

2.1 Enhance the significance of the Locomotive Workshops by relating it to the Carriage Workshops and rail network.

2.2 Conserve the building, as a whole, and its authentic fabric.

2.3 Undertake maintenance as a key process of conservation.

2.4 Conserve *in situ,* significant associated machinery, assemblages, collections, systems and rail lines.

2.5 Leave archaeological remains *in situ* and avoid disturbing them.

3 CULTURAL IDENTITY

3.1 Retain the railway industrial cultural landscape.

3.2 Allow public access and involve the community and those with associations with the place in activities at the site.

3.3 Interpret the place to the public as a railway workshop.

4 NEW WORKS

4.1 Ensure the conservation of the Locomotive Workshops by continuing compatible use.

4.2 When adapting for reuse, enhance cultural significance, maximise the conservation of, and minimise change, to significant fabric

4.3 Design new works so that the heritage significance of the place is retained.

DETAILED POLICIES

5 BUILDING FABRIC – DETAILED POLICIES

5.1 Continue to record the building and works to it, as a basis for monitoring condition and for planning future works.

5.2 Carry out detailed physical investigation of fabric and test repair methods, where necessary, prior to carrying out works.

5.3 Monitor cracks for movement and stabilise structure if necessary. Consider earthquake stability.

5.4 Conserve roof form and significant fabric, maintain it regularly when carrying out major works, reinstate original details.

5.5 Repair the north, west and south walls, as necessary and with minimal intervention.

5.6 Assess and make safe parapet capping and cornice and repair or replace as necessary.

5.7 Clean building fabric carefully and only as necessary for conservation or removal of intrusive coatings.

5.8 Maintain original and replacement timber doors and cast iron windows as recommended in detail and limit insertion of new openings.

5.9 Conserve structure, spatial arrangements and character when adapting to new use and inserting new elements.

5.10 Use appropriate industrial finishes for existing fabric and modern finishes for new work.

5.11 Retain significant early services and expose and suspend new service according to the building's structural grid.

6 MACHINERY - DETAILED POLICIES

6.1 Conserve, *in situ*, the extensive systems, collections and assemblages of machinery, tools and equipment in Bays 1 & 2 (including those in the annexes), the isolated remaining machines and the cranes in Bays 3-16, items adjacent to the building such as turntables and pressure vessels. Conserve machinery moved to Bays 1 & 2 and move to a more appropriate location.

6.2 Carry out inspections for corrosion and maintain anti-corrosion measures.

6.3 Clean as necessary to allow conservation action.

6.4 Treat external surfaces according to existing finish and condition and according to individual recommendations.

6.5 Treat internal surfaces for corrosion.

6.6 Provide steam and power to enable conservation measures to be carried out.

6.7 Preserve fireside and steamside of boilers.

6.8 Preserve key items of machinery including steam engines and hammers, the hydraulic system and the Davy Press.

6.9 The relocated machinery should be treated with preservative in the short term and conserved in former locations or in a new location in the long term.

6.10 Conserve and interpret the traverser.

1 IMPLEMENTATION & MANAGEMENT

1.1 MANAGEMENT & CMP ADOPTION

Set up management structures and identify individuals to manage and execute conservation of the place and its contents

The effectiveness of the Conservation Management Plan depends on how it is implemented, on the existence of a management structure through which it can be acted upon and on an understanding of who is responsible. Australian Technology Park Precinct Management Ltd (ATPPM) is the site operating company of the Sydney Harbour Foreshore Authority (SHFA) manages the site. ATPPM is responsible for the commercial and financial aspects of the ATP, as well as daily management, heritage conservation, strategic development and the master plan.

These policies cover management structures and mechanisms. They refer to a committee or group in an overseeing role, which is currently the Heritage Project Control Group but may in future be some other overseeing committee. However, conservation management should be pursued as an active day-to-day responsibility. It is not adequate to have only a committee in a conservation management role and it should be the active responsibility of an appropriately skilled person.

The exceptional heritage significance of the Eveleigh Locomotive Workshops is, combined with the Carriage Workshops, in its scientific/educational potential. The relative intactness of the building, its setting and the associated machinery enable an understanding of the workings of the site when it was a railway yard. The retention of this aspect of significance of the site depends on the site being managed with an understanding of this physical evidence and the processes that were undertaken over the whole site. Thus, in conjunction with the resolution of the adaptive reuse of the bays in the Locomotive Workshops and any tenancies, a whole of Eveleigh Railway Yards management structure should be developed and formalised with the Eveleigh Carriage Workshops site management.

Include professional heritage representation in the management bodies, as well as representation relating to the active rail network, when necessary. Operation is to be on the basis of clear guidelines that include:

- Ensuring dissemination of information about the heritage values of the place.
- Consideration of the impact of any proposal on heritage significance.
- Effective conservation of the building and its setting.
- Selection of appropriate tenants/occupants to minimise adverse heritage impact.
- Balancing the individual needs of tenants and occupants with public access.
- Management of incremental change.
- Encouraging cooperation to ensure consistent overall management.
- Ensuring that uses and tenancies are based on logical spatial units e.g.. Bays, maintaining the integrity building.
- Ensuring the retention of the industrial setting within and around the building.
- Control of public, pedestrian and vehicular access and car parking to minimise adverse impact.

Policy 1.1.1
Obtain endorsement of the revised Conservation Management Plan from the NSW Heritage Council prior to any works being carried out (REP 26).

Policy 1.1.2
SHFA and ATPPM to adopt the endorsed Conservation Management Plan as a key basis for the future management of the site and communicate this to the lessees and occupiers.

Policy 1.1.3
Refer to the Conservation Management Plan in any lease, sale or other ownership or control agreement affecting the building.

Policy 1.1.4
Aim to integrate development and conservation work and care and management for the building, and the Eveleigh Railway Yards as a whole. Continue liaison between SHFA, SRA, Planning NSW and South Sydney Council.

Policy 1.1.5
Manage the site to ensure that conservation aims and responsibilities are understood and complied with by all parties involved with the place including government, developers, temporary and end users.

Policy 1.1.6
Integrate conservation and development planning, design and construction for new works so as to maintain the continuity of approach and management of incremental change.

Policy 1.1.7
Set up management structures and identify individuals to manage and execute the continuing conservation of the Eveleigh Locomotive Workshops. A management body will be responsible overall for implementing the Conservation Management Plan & policies, seeking approvals, etc.

Policy 1.1.8
Establish clear responsibility for the management and care of the Eveleigh Locomotive Workshops, set out the management structure and make it available to all persons involved.

Policy 1.1.9
Institute an overseeing role by a steering committee or other management entity with an on-going role. Include or consult appropriate expertise as required such as a conservation architect, industrial archaeologist and a State Rail Authority representative. Bodies such as the National Trust could be on the committee or be kept informed as appropriate. The major tenants to be able to request meetings of the overseeing group when required.

Policy 1.1.10
Appoint a “project coordinator” integrated into the site management structure, to implement the conservation policies contained in the Conservation Management Plan, including mechanisms for the stabilisation, short and long term conservation of the place including buildings, machinery and open space. An appropriately skilled individual should be responsible for care and management, giving practical advice and making decisions and should report to the steering committee or other overseeing group.

Policy 1.1.11
Establish a conservation and design review committee, whose purpose is to inform owners, managers and tenants, of the cultural significance and provide guidance for design approaches. This may be related to the ‘steering committee’ or be separate.

Policy 1.1.12
Prior to preparing a development application, hold preliminary meetings with the conservation and design review committee or equivalent committee to examine the conservation strategies and approaches and design principles to retain heritage significance as set out in the CMP.

Policy 1.1.13
Provide temporary users with the “Carer’s Guide” so they understand the significance of the site and act responsibly, minimising intervention in the fabric.

Policy 1.1.14
Develop a Development Application package similar to that used by SHFA at other sites, to guide those preparing proposals.

Policy 1.1.15
Use the current bay numbering system on site but consider reverting to the original bay numbers if the opportunity arises in the future. For instance, where there is a major change of use or ownership. The original system was: Bays 1-4, 4a, 5-15 but is now Bays 1-16 (See also 3.3).

Policy 1.1.16
Review the site policies developed for the Eveleigh Railway Yards by Schwager Brooks, in collaboration with managers of the Carriage Workshops, in light of the revised Conservation Management Plan for both sites.

1.2 THE APPROACH TO CONSERVATION

Adopt an approach, in accordance with the philosophies of "The Conservation Plan" (Kerr 1999) *and the Australian ICOMOS Burra Charter (1999).*

The general policies set the overall approach to conservation of the Eveleigh Locomotive Workshops. The cultural significance of the place is linked to the relationship of the machinery, building fabric and setting as a whole. The assemblage of machinery, including tools, forms an integral part of its value. Work to conserve the place should be a process of repair, maintenance and adaptation. Maintenance is the single most important process to the place's conservation and should aim to protect the building's fabric. Adaptation is acceptable where it does not detract from the cultural significance of the place. Reconstruction is appropriate only where it enhances and reveals the place's significance.

Policy 1.2.1
Use the Conservation Management Plan and Statement of Significance to guide conservation and development of the Locomotive Workshops.

Policy 1.2.2
Retain and enhance the cultural significance of the place, which is embodied in its fabric, setting, use, associations, meanings, records, related places and related objects including its aesthetic and historic, scientific, social or spiritual value for past, present or future generations as set out in the statement of significance in the Conservation Management Plan.

Policy 1.2.3
Conserve the place, using all the processes for care of the place including maintenance, preservation, restoration, adaptation and interpretation.

Policy 1.2.4
Consider the place as a whole, that is, the site, building, components, contents, spaces and the machinery.

Policy 1.2.5
Consider all aspects of the Locomotive Workshops' cultural significance without unwarranted emphasis on any one aspect or stage of its development (Burra Charter, Article 5.1 & 15.4).

Policy 1.2.6
The approach to the building fabric and contents is to be one of minimal intervention, consistent with the place's conservation (Burra Charter, Article 3.1). Intrusive physical investigation can be undertaken only if required for conservation.

Policy 1.2.7
Change may be necessary to retain the cultural significance of the place, but is undesirable where it reduces its cultural significance (Burra Charter, Article 15.1).

Policy 1.2.8
The amount of change appropriate to the place should be guided by the cultural significance of the place and its appropriate interpretation (Burra Charter, Article 15.1).

Policy 1.2.9
Ensure that any changes, which reduce cultural significance, are reversible and are reversed when circumstances permit (Burra Charter, Article 15.2).

Policy 1.2.10
Assess the impact of proposed changes on the cultural significance of the place with reference to the statement of significance and the policy for managing the place.

Policy 1.2.11
Carry out urgent works whenever they are identified. Clear the drains of the pit under the boilers.

1.3 USE OF THE CMP

Apply this CMP and associated information when undertaking conservation and development works.

The CMP provides policies to guide decision-making relating to the conservation of the place and development. It also provides practical information to guide documentation of works, in particular the building fabric inventory. The conservation plan meets the requirements of the Sydney Regional Environmental Plan No. 26 – City West (SREP 26) for consideration by the consent authority when assessing development applications. It also serves as a reference document for historical and physical information about the building.

Conservation work undertaken in accordance with a Conservation Management Plan that has been endorsed by the Heritage Council does not require Heritage Council approval. Other exceptions from the need to obtain approvals are, in general, maintenance and are work covered by:

- Standard Exemptions under s. 57(ii) of the Heritage Act as issued by the Heritage Council.
- Work identified in SREP 26 as not requiring consent (Clause 13 and Schedule 3 - see section 6.3.1).

In order to remain relevant, the Conservation Management Plan needs to be regularly reviewed, and revised to include new information. New information may include further historical research, social history research, information from former machine operators, archaeological findings and recent work on the place.

Of necessity the document uses jargon and is too bulky for on-site use. A "Carer's Guide" in the form of a short manual or pamphlet is being prepared, summarising key points in lay terms and which is suitable for issue to site workers or users. It will provide contact information for approvals or advice.

Policy 1.3.1
Development proposals for the Locomotive Workshops should be in accordance with policies in this Conservation Management Plan.

Policy 1.3.2
Seek approvals as required by legislation and address the Conservation Management Plan in planning and development applications, applications under the NSW Heritage Act and in statements of impact. In the future, formally identify works that are exempted from the SREP 26.

Policy 1.3.3
Where approval is not required, undertake works in accordance with the aims and intentions of this Conservation Management Plan and its detailed conservation policies and following the preparation of a Statement of Heritage Impact. The statement needs to demonstrate that the proposed work is consistent with the significance of the item and indicate how it meets the requirements of the Conservation Management Plan.

Policy 1.3.4
Lodge copies of the completed Conservation Management Plan with the consent authority, a public library and with the stakeholders in the site and make it readily accessible by the public.

Policy 1.3.5
Review, and if necessary revise, the Conservation Management Plan every five years or when otherwise required, take into consideration any new information.

Policy 1.3.6
Use the Building Fabric Inventory, which addresses significance, condition and recommended conservation works for each element, to guide works.

Policy 1.3.7
Brief all those working at the site on the conservation of the place and the need for care. This may be as part of a work instruction program and may include a one page briefing note, and/or sign, video, model, etc.

Policy 1.3.8
Provide relevant specific detailed information to all levels of owners and users extracted from conservation documents including the CMP, and any future Maintenance Plan, Interpretation Plan or similar document.

Policy 1.3.9
Make the “Carer’s Guide”, written in lay terms, readily available to inform all those involved in working on the Locomotive Workshops.

Policy 1.3.10
Carry out in the medium to long term, the further research identified in this Conservation Management Plan, including social and oral history.

Policy 1.3.11
Compile and maintain on-site current and historical documentary material such as photographs, maps, plans, drawings and reports relating to the construction and conservation of the Eveleigh Locomotive Workshops.

2 CONSERVING THE FABRIC

2.1 EVELEIGH RAILWAY YARDS

Enhance the significance of the Locomotive Workshops by relating it to the Carriage Workshops and rail network.

This section relates to the physical fabric including more ephemeral fabric, such as views or social associations that link the Locomotive and Carriage Workshops and the rail network. The Statement of Significance affirms that the Eveleigh Railway Yards are of exceptional significance nationally and internationally. This level of significance is due to the historical association between the two workshops, which are rare surviving examples of railway workshop complexes. The association of the workshop to the railway system is fundamental to its original development and use and crucial to the significance, understanding and interpretation of the place. Buildings, open spaces, circulation, rails, machinery, moveable items and services demonstrate the processes of railway operation manufacture, maintenance and the evolving process of how engines and carriages were built and maintained.

The retention of this aspect of significance depends on the place being managed with an understanding of the industrial processes used over the whole site and of the physical evidence that links the two. Part of this physical evidence is the fabric of both the Locomotive and Carriage Workshops that compliment each other.

The Carriage Workshops are surplus to the needs of the SRA and development is proposed. In early 2002 a masterplan was being prepared and it was proposed that part of the site would be a Rail Heritage Park, part an arts facility and that there would be commercial and residential development. There is also a much longer term plan to develop Redfern Station with a major overbridge building, though in the short term a simpler pedestrian overbridge is more likely.

Policy 2.1.1
Retain and enhance the historical relationship between the Locomotive and the Carriage Workshops sites as part of the overall heritage significance of the Eveleigh Railway Yards.

Policy 2.1.2
Retain, develop and interpret the physical and social relationships between the Locomotive Workshops and the Carriage Workshops as part of the overall Eveleigh Railway Yards.

Policy 2.1.3
Promote the recognition that the Locomotive Workshops is part of the Eveleigh Railway Yards (i.e. both sides) in the conservation, adaptation, management structure, signage, interpretation, urban design elements, views and vistas and site links. Cooperate with the Carriage Workshops management.

Policy 2.1.4
Maintain the current railway access to the north side of the Locomotive Workshops and Innovation Plaza to enable rail vehicles to be displayed, thus retaining the possibility of future railway reuse.

Policy 2.1.5
Maintain and develop key visual connections between the Locomotive and Carriage Workshops based on the major historical vistas, and the cultural significance of the place.

Policy 2.1.6
Liaise to establish pedestrian connections to the Carriage Workshops and continued access to Redfern Station. Keep the design of connecting structures in line with the character of the site and, where practical, utilise historical access points and routes.

Policy 2.1.7
Provide information when appropriate, on the ATP public domain design to allow coordination of the strategy during the future development of the public domain design at the Carriage Workshops.

Policy 2.1.8
Limit visual separation between the site and the active railway lines. Fencing etc. may define the edge of the yard but should maintain the industrial character and visual link with the rail network.

2.2 THE BUILDING

Conserve the building, as a whole, and its authentic fabric.

Maximising the survival of original fabric is important to keep the building's authenticity and significance. If there is a choice, retain available existing fabric, e.g. do not generally strip back the walls for painting, instead paint over; when repairing embedded downpipes do not unnecessarily disturb the brickwork. If original material has to be removed it should be recorded. Records made before intervention are intended to add to the documentary evidence of the place and should include photographs and plans locating all items involved.

Maximising retention requires tradespeople skilled in dealing with old materials and confident in making assessments not to replace. The works are an opportunity to assist in the training of tradespeople in high level skills, which is desirable as it continues the tradition at the site and builds the skill base for future works at the Locomotive Workshops. See also later detailed building policies.

Policy 2.2.1
Conserve significant existing fabric by repair and preservation. Conserve individual elements according to their significance and as recommended in the Inventory. The table in section 5.5 shows the recommended approach for fabric of each level of significance.

Policy 2.2.2
Commit ongoing and adequate financial resources to the continuation of conservation work.

Policy 2.2.3
When the opportunity arises, remove intrusive elements identified in the Site Inventory (Burra Charter, Article 26.1).

Policy 2.2.4
Prioritise conservation action according to conservation needs. Address unstable fabric or deterioration, which endangers significant fabric, first.

Policy 2.2.5
During documentation and work, retain the maximum amount of significant fabric and patina consistent with the preservation of the element and in relation to the relative significance of the element. Replacements are of less heritage value than the original fabric and any intervention required should be in areas of new fabric to avoid original fabric.

Policy 2.2.6
Reconstructing elements to a known earlier state, for example the east wall, is acceptable if it is required for conservation, if it enhances the significance, does not distort existing evidence and allows interpretation of the change. Reconstruction is not necessary for conservation but may be necessary for interpretation, but repair and preservation are to have priority (Burra Charter, Article 20.1).

Policy 2.2.7
Before any intervention, record existing fabric that is to be altered or removed, for example in order to repair the structure, or to reveal aspects of the building's significance. Retain the record, and if applicable, a sample, on site.

Policy 2.2.8
Consider annexes as part of the whole. Annexes no. 2, 4 and 6 contain significant machinery and must be conserved *in situ*. The structure of Annexes 12 and 13 should be conserved, but the interiors may be adapted. Annex 1 contains highly significant machinery, but the structure itself is of state significance.

Policy 2.2.9
Use only appropriately skilled tradespeople or professionals with demonstrated experience to carry out and supervise any work; for example, a conservation architect for project control, skilled bricklayers for brickwork, specialised machine fitters for machinery. Encourage the training of apprentices and tradespeople in higher skills where appropriate during the works.

Policy 2.2.10
Employ traditional techniques in conservation work. Modern techniques may be used for which a firm scientific basis exists and which have been supported by a body of evidence (Burra Charter Article 4.2).

Policy 2.2.11
Stockpile existing fabric removed from the structure which is appropriate for future reuse. Protect from deterioration and theft and keep a list of the items, including material previously removed, such as the countershaft girders from Bays 10 to 14 and the original light fittings.

Policy 2.2.12
Where appropriate, materials from one section of the building may be used to repair other parts of the building. Matching old materials from other sites, may be used in repairs. New materials can be used if available or made to match, e.g. cast iron windows.

Policy 2.2.13

Repair and replace any original fabric temporarily removed, as soon as possible to ensure its security.

Policy 2.2.14

Conservation and maintenance should retain historic services and fittings. Where new services are required in significant areas, add them as further layers and distinguish new from old (Article 10, Article 22.2).

Policy 2.2.15

Materials held off-site that have provenance from the Locomotive Workshops should be returned to the site if possible.

Figure 7.1: Stockpile of original light fittings from the workshops. Until recently, the fittings were stored within a fenced area to the southwest of the Locomotive Workshops and were unprotected from the elements. See Policy 2.2.11.

2.3 MAINTENANCE

Undertake maintenance as a key process of conservation.

As long as health and safety regulations are observed and the integrity of the building is not compromised, the current approach to building maintenance is for minimal intervention. These policies recognise that maintenance is an important conservation process. A Maintenance Plan is being developed and will be coordinated with the management and usage of the place. The Maintenance Plan should be subject to regular review.

Policy 2.3.1
Conserve the fabric of the place by preservation, stabilisation and (in the long term) continuing maintenance, the singlemost important process of conservation.

Policy 2.3.2
Prepare a Maintenance Plan for the Locomotive Workshops which includes regular inspections, outlines who is responsible for various aspects of it and allows for prompt follow-up maintenance and repair if required (Burra Charter, Article 2).

Policy 2.3.3
Inspect the significant fabric on a cyclised basis in accordance with a Maintenance Plan, or after extreme climatic conditions e.g., hailstorms or earthquakes.

Policy 2.3.4
Regular inspections and maintenance to be undertaken by persons skilled in the conservation of buildings and machinery of this nature and with an understanding of the heritage value of the Eveleigh Locomotive Workshops (Burra Charter, Article 30).

Policy 2.3.5
Commit ongoing and adequate financial resources to the development and implementation of a Maintenance Plan.

Policy 2.3.6
Repair rather than replace significant fabric through conservation and maintenance.

Policy 2.3.7
Retain and do not obscure evidence of former railway work practices through conservation and maintenance.

2.4 THE MACHINERY & RAILS

Conserve in situ, *significant machinery assemblages, collections and systems and rail lines*.

The Cultural Significance of the place is linked with its past operation as an industrial workshop. The ability of the Workshops to demonstrate their past industrial processes relies on the continued presence of the machinery. Retention of the highest heritage value of the place depends on the operation of the machinery and interpretation of industrial processes. This is a unique feature of the Eveleigh Locomotive Workshops.

The Workshops were initially powered by steam-powered boilers, via lineshafting, with electricity introduced around 1900 to drive the lineshafts. Steam continued to be a major power source up until closure in the 1980s, and was particularly important for the operation of the large hydraulic Davy Press. In some cases, small electric motors replaced lineshafting on smaller machines preserved at the Workshops, and which bear clear evidence of the change in technology.

To make systems operational for educational and other demonstration purposes it may be appropriate to operate machinery using a different power source e.g. Boilers fired with gas rather than coal to produce steam or use portable electric motors.

The relationship between the various items of machinery and their associated tools demonstrates important aspects of their operational use. This evidence is lost if the relationship between the items is broken, and it is therefore important that this relationship is reinforced through effective interpretation. Retain fixtures *in situ* and where possible, leave contents and objects that contribute to cultural significance, *in situ* as well. See Section 6 of this chapter for detailed machinery policies.

The connection of the railway network was crucial to the place's operation and is reflected in its design. Rail level was the base line on the original drawings, rather than the usual "finished floor level". In Bays 1 & 2 keep the floor level at rail level. In other bays the floor level was raised in 1996 as part of the adaptive reuse. Rails and pits etc. remain under the new floor and should be retained and interpreted. Rails and some turntables remain in some areas immediately outside the building. These should continue to be retained and need interpretation so the former function of the place can be understood. Similarly, the overhead travelling cranes, where crucial to the operation of the place and the generated design of the building, should be conserved and interpreted. In the long term, make one or some of the cranes operational.

A detailed study was carried out in 2001/2002 covering the relocation, interpretation and conservation of the machine tool and spring making machinery collections. Much of this machinery is stored in Bays 1 & 2 but was relocated from elsewhere in the Eveleigh Railyard. Refer to this study for detailed information but the general approach is incorporated in these policies.

Figure 7.19: Crane operators' cabin, Bay 13 (old Bay 12). Photo: Istvan Czehmester, 2002.

Policy 2.4.1
Retain existing rail lines, pits and turntables *in situ* and visible (Burra Charter Article 9.1). Where not visible, interpret them.

Policy 2.4.2
Maintain the existing rail link to the railway system and retain evidence of former links, e.g. through doorways on all sides, to the remaining lines and turntables on the south side and to the traverser road and buildings to the west. Existing rail lines and turntables should remain in-situ and visible, eg. to the south of the building, the traverser to the west of the building. Relocation of elements, especially out of context, is not recommended (Burra Charter Article 9.1, 9.2, 9.3).

Policy 2.4.3
Conserve all machinery and tool assemblages, collections and systems by regular maintenance and according to any detailed plans or studies of the machinery.

Policy 2.4.4
Keep associated items together including related machines, power systems that operated them and tools for using them.

Policy 2.4.5
Functioning machinery and power systems are to be maintained as operational where practical. Repair non-operational machinery which is crucial to understanding the operation of the place, e.g. the Davy Press and the cranes.

Policy 2.4.6
Ensure that users of the machinery understand its significance and do not make any adaptation or change without reference to the Conservation Management Plan and without consulting an industrial archaeologist or machinery conservator.

Policy 2.4.7
Where practical, floor and other finishes around machines should be as required for operation e.g. sand or other absorbent finishes around the Davy Press.

Policy 2.4.8
Do not undertake new work that precludes interpretation of the overhead travelling cranes or in the longer term, making one or some operational.

Policy 2.4.9
Significant machinery and associated services are to remain *in situ*. The removal, from its original or pre-1980s locations, of any machinery significant to the Eveleigh Locomotive Workshops, including associated services, is unacceptable unless it is the only means of ensuring its survival.

Policy 2.4.10
Relocate machinery not in its original or pre-1980s location to a part of the building that most closely reflects its historic use and in accordance with individual plans or policies, endorsed by the Heritage Council and in accordance with the Heritage Office's guidelines for moveable heritage.

Policy 2.4.11
Machinery not originally from the building, but related to it, may be displayed in the building if appropriately interpreted. It is preferable to keep it in close proximity to its original location e.g. machinery from the Wheel Press Shop, which was a building immediately south of the Locomotive Workshops.

Policy 2.4.12
Do not locate machinery unrelated to the Eveleigh Railway Yards in the Locomotive Workshops unless it is part of a temporary exhibition or interpretive display.

2.5 ARCHAEOLOGY

Leave archaeological remains in situ, *avoid disturbing them and interpret them where appropriate.*

The current philosophy regarding the conservation of archaeological relics, is that they are best conserved by remaining undisturbed. Avoid known remains, such as significant pits for working under carriages and pits at sets of points and turntables, when new works such as service trenches are being laid. Stormwater drains and other underground services may be found throughout the site although their exact locations are not known.

Policy 2.5.1
Leave archaeological remains *in situ* and adopt strategies for development that avoid disturbing archaeological remains.

Policy 2.5.2
Consult with the SHFA archaeologist before commencing work that has the potential to disturb archaeology. The archaeologist is to advise on the required process e.g. excavation permit must be obtained from the NSW Heritage Office.

Policy 2.5.3
If work in the vicinity of archaeology is unavoidable or significant artefacts are unexpectedly disturbed, an appropriately skilled archaeologist should be engaged and an archaeological permit must be obtained (Heritage Act, 1977 Amended 2001).

Policy 2.5.4
Where underground services are discovered, the SHFA archaeologist it to assess their significance and whether they are active before disturbance or removal.

Policy 2.5.5
Do not undertake archaeological investigation unless relics will be disturbed by other work or if required for interpretation.

Policy 2.5.6
Intervention for archaeological investigation, other than associated with conservation and reuse, must only proceed on the basis of an explicit proposal from a skilled professional and an excavation permit under the Heritage Act, 1977 (Amended 2001), must be obtained.

Policy 2.5.7
Excavate and display some of the underground structures as part of the interpretive strategy of the site e.g., part of a traverser pit and an adjacent service pit (see section 6.7 Design Principles for New Work for example).

3.0 CULTURAL IDENTITY

3.1 CULTURAL LANDSCAPE

Retain the railway industrial cultural landscape.

The character of the Eveleigh Locomotive Workshops as a railway industrial site is essential to the significance, understanding and interpretation of the place. The site of the Locomotive Workshops is an industrial cultural landscape and it is inappropriate obscure this by giving the site a sense of 'heritage' it never, had or to 'clean' it up. The survival of the industrial character and the railway features give the place its cultural identity.

Policy 3.1.1
Retain the large-scale industrial character of the Locomotive Workshops.

Policy 3.1.2
Maintain an appropriate visual setting, e.g. new construction, which would adversely affect the setting or relationships to the adjacent heritage structures is not appropriate (Burra Charter, Article 8.2).

Policy 3.1.3
Treat circulation areas, areas occupied, or formerly occupied by machinery, and open spaces with materials and detail that retain their character e.g. surfaced in asphalt or concrete with rails visible.

Policy 3.1.4
Keep new fencing and street furniture such as seating, bollards and light fittings in character with the large-scale railway industrial character of the place. A simple modern design is acceptable, whereas a domestic or formal 'heritage' look is inappropriate for the site. Items already installed are appropriate and a consistent approach should continue.

Policy 3.1.5
Planting and landscaping on site should be limited, and be designed so the industrial character is retained. Current use of domestic-scale planter boxes on the south side is inappropriate.

Policy 3.1.6
The design of signage should not detract from the visual character of the place. Signs already installed are appropriate.

Policy 3.1.7
Develop guidelines for street furniture, signage and detailing of new work to ensure consistency across the site.

3.2 ACCESS & COMMUNITY VALUES

Allow public access and involve the community and those with associations with the place in activities at the site.

The Statement of Significance identifies the cultural and social associations with former workers and the community, as significant themes. The place was an integral part and catalyst for the historical development of the surrounding area. Ensure the place continues to be available for public inspection and for related community functions. In recent years "Back to Eveleigh" days have been held during Heritage Week to encourage former workers to visit the site. Names and contacts have been collected. Such events are valuable to those attending and provide oral history information about the place.

Policy 3.2.1
Allow public access within the limits of security required for commercial operations and personal safety.

Policy 3.2.2
Ensure that adaptive reuse, interpretation and new development on the site is undertaken with community consultation. Build on the links with the neighbourhood.

Policy 3.2.3
Recognise and enhance community esteem and values for the site through the continuation and future development of oral history projects and on-site events and activities that are accessible to the community.

Policy 3.2.4
Consider the establishment of a facility on site to enable the recording of, and access to, social history information, e.g. as part of future interpretation.

Policy 3.2.5
Hold annual open days with an emphasis on promoting the heritage value of the site. Heritage open days will promote the ATP also.

Policy 3.2.6
Consider establishing a 'Friends of Eveleigh' to be involved in tours, historical and oral history etc. For instance, former Locomotive Workshops employees have established a "Yahoo group" on the Internet where former and current employees and their families can log-on and "post messages, share pictures, tell stories, find out about depot get-togethers, exchange ICQ, Yahoo Messenger or MSN Messenger identities" (http://groups.yahoo.com/group/eveleigh/).

Figure 7.2: The number of former Eveleigh Railway Workshops employees who attend "Back to Eveleigh Day" is a good indication of the lasting impact the place had on many who were involved there. This photo was taken in the Innovation Centre which was converted from the New Engine Shop. Photo: Jean Rice, 1998.

3.3 INTERPRETATION

Interpret the place to the public as a railway workshop.

Continue to make the place available for public inspection and for related community functions. A guidebook to the place would enhance the significance to the public and could be based on information in this and associated documents. Base interpretation on historic documents and factual material, enhanced by oral history. The bays of the building were recently renumbered by eliminating Bay 4a, which confuses historic references, and it is strongly recommended that they be interpreted and reinstated in the future. Note that the Carriage Workshops are numbered consecutively i.e. Bays 16 – 25, which means that two Bay 16s exist in the Eveleigh Railway Yards.

Policy 3.3.1
Prepare an Interpretation Plan that is based on the significant historical themes.

Policy 3.3.2
Use the interpretation of the Locomotive Workshops in the interpretation of the overall Eveleigh Railway Yards. Keep interpretive signage and content consistent across the Locomotive and Carriage sites.

Policy 3.3.3
Tell the story of the place, its processes, its products and people to visitors to the site through the fabric of the place and by interpretation

Policy 3.3.4
Interpret the previous functions of the Eveleigh Locomotive Workshops by combining:

- interpretive devices (pamphlets, displays, signs, tours/ open days),
- displayed equipment such as locomotives and parts of locomotives
- restoration and where appropriate limited reconstruction of fabric and
- allow access to the public and specialists.

Policy 3.3.5
Interpret the building through the continuing use of traditional access points and routes.

Policy 3.3.6
Interpret the industrial processes of locomotive manufacture and repair.

Policy 3.3.7
Interpret the tools, machinery and systems as part of an industrial process and in accordance with any machinery conservation plan.

Policy 3.3.8
Interpret the contents and modern fitout i.e. when they were added and the historic use of those areas.

Policy 3.3.9
Use further research e.g. on SRA plan records and on social history, to inform the interpretation of the site.

Policy 3.3.10
Signage should be contemporary not historicist, be of a high design quality, and be fixed, in accordance with traditional patterns and placement of signs. Information should be succinct, clear and consistent across the site and should include item or building specific material and relate items to their historical, physical and operational context.

Policy 3.3.11
Produce a guidebook to the place, in the long term, possibly for the whole of the Eveleigh railway Yards and in conjunction with the Eveleigh Carriage Workshops management.

Policy 3.3.12
Interpret the renumbering of the bays to avoid confusion in historic references (see also Policy 1.1.15).

Policy 3.3.13
Obtain high quality digital copies of the historic plans of the building for reference purposes and for interpretive display.

Figure 7.3: Interpretive signage in the Launceston Railway Yards is designed utilising industrial materials with railway references. Source: Tasmanian Tourism publicity, 2002

Figure 7.4: A tour of the old Locomotive Workshops during Heritage Week 1999. Groups usually consist of former employees, their families and other interested participants. Photo: Jean Rice 1999.

4.0 NEW WORKS

4.1 COMPATIBLE FUTURE USES

Ensure the conservation of the Locomotive Workshops by continuing compatible use.

Finding compatible new uses for a place is vital to its conservation. An empty building is subject to vandalism and the effects of neglect. Uses should be compatible and preferably enhance significance. Current uses of the building are generally compatible and the use of Bays 1 & 2 by blacksmiths enhances significance. Adaptation can take advantage of building's features, for example the use of the Bay 8 (former Bay 7) traverser opening as a main entrance. The scale of the building allows for an adaptive loose fit involving minimal intervention in the existing fabric.

Figure 7.5: This railway workshop was reused as a pottery and sculpture workshop. Source: Binney & Pearce, p.227

Policy 4.1.1
Make the minimum changes necessary to accommodate new uses, while retaining or regaining the cultural significance of the place (Burra Charter, Article 21.1 & 21.2).

Policy 4.1.2
Future uses should be compatible with the conservation of the building as follows:
- be sympathetic to the configuration and significance of the building.
- utilise traditional circulation patterns and entry points such as doorways.
- retain significant fabric and spaces including the large open spaces and their cross-sectional volume with minimal subdivision.
- retain views and axial and diagonal vistas of the volume and the supporting structures.
- do not result in unacceptable levels of wear and tear or major traffic generation
- retain and enhance the industrial character, including the present level of finishes and do not "clean up" or sanitise the place.

Policy 4.1.3
Discourage uses which lessen, obscure or confuse the many historical associations of the place and which do not take advantage of the interpretation potential of the place.

Policy 4.1.4
Encourage uses that reflect the historic processes and manufacture of the railway workshops, are related to the railway, are industrial and allow public assess to and interpretation of the place (Article 7.2).

Figure 7.7 (top) & 7.8: Pocklington Station at Humberside was reused as a sports hall by a local school retaining the large volumes and requiring minimal change. Source: Binney *et al*: 220-1

Policy 4.1.6
It is preferable to select the tenant whose requirements are suitable for the space, rather than modifying the space to suit the tenant.

Policy 4.1.7
The preferred option for Bays 1 & 2 is as a productive engineering workshop associated with the railway or similar trades. If it is not possible for workshop operations to continue, then retain the capacity to do so, preferably using the machines occasionally to demonstrate how an item is produced (Burra Charter, Article 7.1).

Figure 7.9: The terminus of the Stockton-Darlington Railway was reused as a railway museum. Source: Binney *et al:* 219.

4.2 PRINCIPLES OF ADAPTIVE REUSE

When adapting for reuse, enhance cultural significance, maximise conservation of significant fabric and minimise change.

Policy 4.2.1
Consider adaptive reuse in the light of the following criteria:
- cultural significance should not be compromised
- conservation and enhancement of the integral relationship between the industrial setting, space and buildings (including the Innovation Centre)
- modern services should not damage or compromise significant fabric or spaces
- adaptation involving minimal change is preferable
- adaptation, including fitout, should suit the character of the place.

Policy 4.2.2
Ensure that the adaptive reuse of the bays reflects their significance and is undertaken in ways that allow their former functioning to be seen and understood i.e. be based on an understanding of the place.

Policy 4.2.3
Continue the overall interpretation of the Eveleigh Railway Yards and consider the recovery of significance through various approaches to interpretation.

Policy 4.2.4
In future work in Bays 3 – 9 (old Bays 3, 4, 4a, 5 - 8) aim to recover the openness and character of the industrial interiors (e.g. SHFA conference room) and interpret and reveal structures that show evidence of the workshop (e.g. pits).

Policy 4.2.5
In Bays 10 – 14 (old Bays 9 - 13) new elements may be introduced to facilitate compatible use but retain the feeling of openness and do not increase the density of new elements above that shown in the historic views of the place (figure 12, opposite).

Policy 4.2.6

Ensure new fitouts are innovative and of high design excellence. Retain or regain significant view and vistas within and through these spaces either by limiting bulk and scale and the use of transparency.

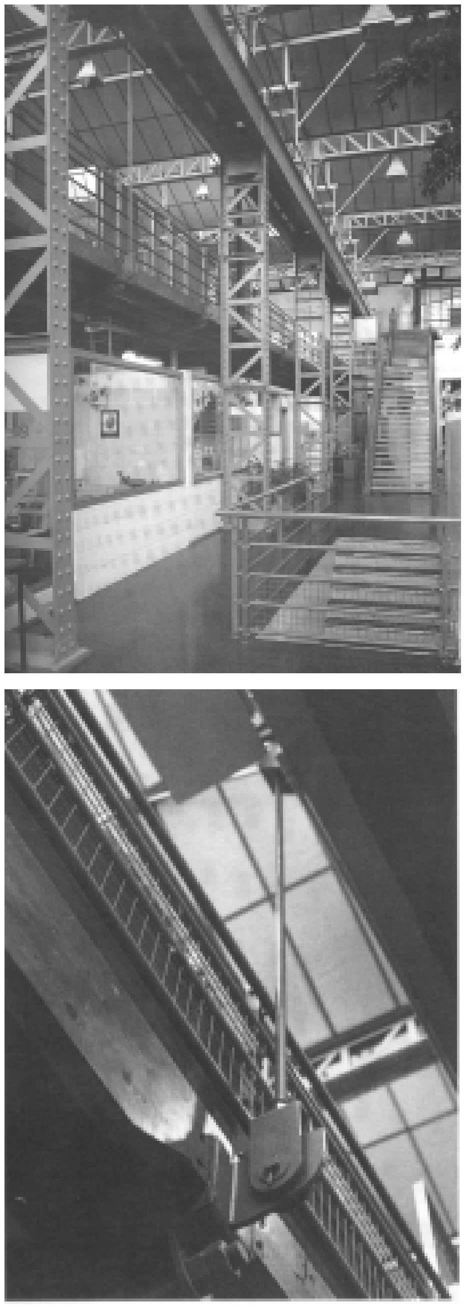


Figure 7.10 (top) & 7.11: The Communication Pavilion of the National Centre for Scientific Research in Meudon, France, is in a 1920's industrial building converted by architects Reichen & Robert in 1988. The interior is open and spacious with a play of levels. The structure is exposed lending rhythm and coordination to the interior. The mezzanines are suspended from the travelling crane rails with industrial style detailing. Source: Pelissier: 86-7.

Policy 4.2.7
Appropriately reference railway technology and building in new fitouts for adaptive reuse of spaces. In particular the traditional practice of accommodating offices etc. in lightweight and portable (adaptable) structures placed in the large spaces (see examples in Bays 1 & 2).

Policy 4.2.8
Limit new fitouts in the remaining large spaces to a single storey to allow the appreciation of the volumes. Limited upper levels can be inserted using traditional precedents such as walkways, balconies overlooking, to provide services and towers to accommodate tall machinery (see examples).

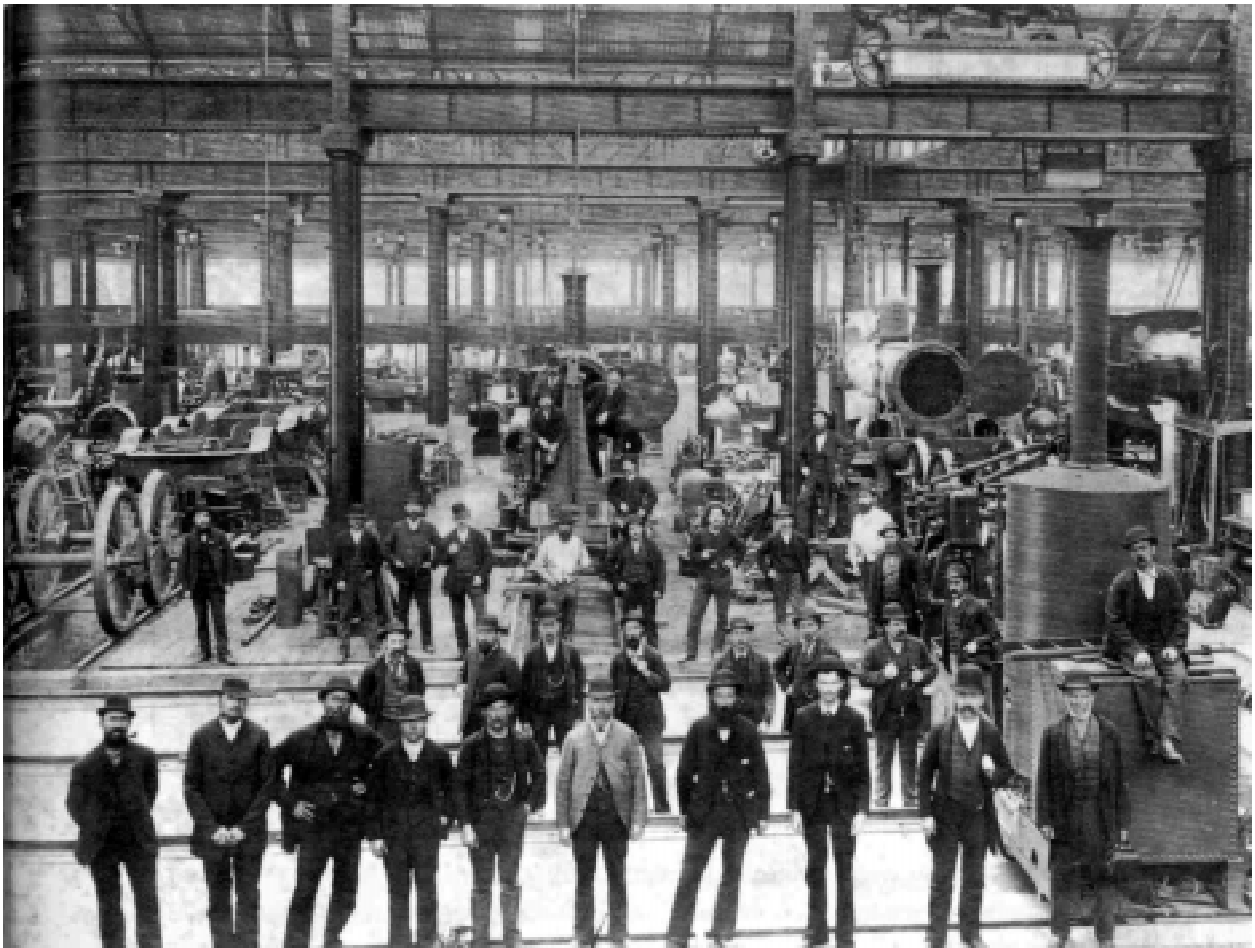


Figure 12: Portrait of the Locomotive staff in the Locomotive Workshops. This photograph is taken from Bay 8 (old bay 7) looking west. In the foreground is the traverser road which is about a foot lower than the adjoining floor level. The second row of men are standing in the traverser road. On the right is the traverser and a man is sitting on the boiler that powered it. In the next two rows are pits with sets of wheels stores on the left and locomotives on the right. In the background can be seen the countershaft girders and lineshafts over which powered machinery in those bays. Date c1890 from comparison of the men in the photo with other dated photographs. Source: Lee 2000: 267.

4.3 NEW WORKS

Design new works so that the heritage significance of the place is retained.

New work will be required to adapt the place to new uses. Many previous additions now removed failed because of their poor quality. Ensure that new work is of high quality as was the original building. Discourage new work that dominates the existing structure and keep it within the building envelope. New roof structures similar to the existing towers are acceptable, protruding the envelope if necessary. New structures south of the building should be of a similar scale to the annexes. The Burra Charter does not prohibit the use of modern materials and techniques. Using modern materials and techniques can be an effective way in distinguishing new work from original but must be used with care and design excellence.

Policy 4.3.1
New work or changes are to be compatible with the heritage significance of the place, i.e. minimise impact, be distinguishable from the original, and be as easily reversible as possible.

Policy 4.3.2
Derive the design and arrangement of new structures from an understanding of the context and structure of the building and the industrial themes.

Policy 4.3.3
Reflect the original design concept and spatial arrangements in new work. The existing building is to be a starting point for the design of new work.

Policy 4.3.4
Discourage new development that obscures significant fabric, or overwhelms the existing building.

Policy 4.3.5
New construction should address but not mimic the existing in terms of scale, materials, colour, texture and quality.

Policy 4.3.6
Undertake new design and conservation work in collaboration i.e. include a conservation specialist in the design teams.

Policy 4.3.7
Match the excellence of the original work in the quality of design and construction of new.

Policy 4.3.8
Utilise new work, wherever required, as an opportunity to enhance or recover significance.

Policy 4.3.9
Aim for a design approach for new work that favours a sympathetic contemporary idiom and not historicist reproduction, is of high design quality and takes appropriate references from the industrial character of the site and the historical use of innovative materials and structure.

Policy 4.3.10
Locate new structures on the southern side of the existing building as annexes, or within the building envelope and reflecting the place's internal planning.

Figure 7.13: This foundry in California has been adapted as ofices for the Gary Group. It uses an uncompromising industrial aesthetic but a modern style. Source: Greer 1998: 164.

DETAILED POLICIES

5.0 BUILDING FABRIC

These recommendations for the building do not stand alone but should be considered in relation to the proceeding general policies and the following recommendations on machinery.

5.1 GENERAL POLICIES

Continue to record the building and works to it, as a basis for monitoring condition and for planning future works.

Policy 5.1.1
Continue to update the detailed building fabric inventory as a basis for documentation and review the policies and recommendations in the light of the detailed survey.

Policy 5.1.2
Give priority to keeping the building watertight and disposing of stormwater and preventing water entry into building fabric e.g. through the stone cornices.

Policy 5.1.3
Undertake detailed recording, including photographic, measured details and video, prior to commencement of major works.

5.2. INVESTIGATION & TESTING

Carry out detailed physical investigation of fabric and test repair methods, where necessary, prior to carrying out works.

Many of the elements of the place are unusual with site specific details. Repair methods need to be devised in advance for individual problems rather than finding problems during the contract period. Scientific and physical investigation is needed prior to, or as part of, documentation of works. This is to assess elements to understand both obvious and latent defects and to devise conservation methods and techniques prior to major works and as part of the documentation process. Investigation of some elements was carried out when they were repaired during adaptation for the ATP including:

- settlement, condition of timber piles
- removal of a cast iron window to examine condition and nature of fixing lugs and to provide a model for new castings.
- termite damage
- brickwork, nature of deposits, salt contamination
- iron finishes, for corrosion protection and aesthetic reasons
- The embedded downpipes and drains at columns where bypassed in the works by new stormwater disposal systems but remain *in situ*.


Figure 7.14: Test panel of cleaning techniques showing original bricks under layers of intrusive paint. It is recommended that maintenance test panels are not located in prominant areas (see Policy 5.2.2).


Figure 7.15: The original drainage system in the workshops was investigated during the ATP refurbishment. Subterrainian structures, which were not fully recorded, are also shown in this photo. Photo: Otto Cserhalmi, 1996.

Policy 5.2.1
Retain specifications and details of repair methods developed by previous testing. Carry out additional investigation by relevant conservation consultants (such as an industrial archaeologist, conservation architect, metallurgist, scientific laboratory, etc.) including:

- roof elements and cast iron gutters
- paint, composition and colour
- corrosion of metals
- stability of gable brickwork

Policy 5.2.2
Utilise information from tests and techniques developed for previous projects on the site. Test new techniques for repair on site before final methods are selected. Do not place test panels in prominent locations. Tests are to include:

- brick and stone cleaning
- repointing
- bricklaying
- epoxy patching of stone
- painted finishes
- patching methods generally
- stabilising treatments for finishes

5.3 STRUCTURE

Monitor cracks for movement and stabilise structure if necessary. Consider earthquake stability.

The building as a whole is believed to be structurally stable and to require only repairs to defects. Major underpinning work has been undertaken to some of the foundation structure of bays 1 – 4 which was on timber piles. Cracks should be monitored to confirm that movement/subsidence has halted. The configuration of the building with brick parapets means it is susceptible to earthquake damage and this should be assessed. The very similar Honeysuckle Workshops were affected by the Newcastle earthquake.

Policy 5.3.1
Monitor structural defects in detail, by an engineer, for continuing movement, extent of movement and to devise repair strategies. This includes the following areas, which were stabilised or underpinned during adaptation for the ATP:
- north-east corner for subsidence and steel lintel in Bay 1 Row 15
- gables, southern end of Bays 1-4
- columns that have subsided.

Policy 5.3.2
If it is found to be moving, stabilise structure prior to carrying out extensive fabric repairs or new work.

Policy 5.3.3
Assess the building, especially parapets, for earthquake stability and consider tying in parapets to the roof structure as part of conservation works.

Figure 7.15: Arrow pointing to cracking along and across soldier course at the top of the gable in Bay 11 (old Bay 10). Cracks such as this require repair and monitoring. Photo: Istvan Czehmester, 2002.

5.4 ROOF

Conserve roof form and significant fabric, maintain it regularly when carrying out major works, reinstate original details.

Repairs to roof and stormwater disposal systems have high priority to ensure watertightness. The roof was repaired in 1996 by oversheeting in new corrugated steel. The former roof lights were also oversheeted and the only surviving original glazed roof lights removed (from former bay 15, current bay 16). The former roof is *in-situ* and is visible from the interior. The original cast iron gutter system linked to the columns was bypassed and a new system of plastic downpipes installed. The monitor roofs, which were corrugated iron, were replaced with translucent sheeting. The sides of the monitors were heavy gauge curved iron louvres which survive but have not been conserved. New clear cladding (glass or polycarbonate) has been installed to prevent water entry but also limits ventilation.

Figures 7.16:

Cast iron toggles in parapet (above and below). Photos: Otto Cserhalmi 1995.

Figure 7.17:

System

The building has an integrated structural and rainwater disposal system. Work on any parts of it will impact on other parts. Though elements such as the column downpipes are not in use as downpipes they are required as structural elements and are still significant as downpipes.

Policy 5.4.1
Any future work to the roof is not to detract from the integrity of the original structure and system which is under the new roofs and gutters.

Policy 5.4.2
Ensure the retention of the whole gutter, downpipe, underground stormwater system even though this is, in some cases, now redundant.

Policy 5.4.3
Consider future reinstatement of a section of the former integrated water catchment and disposal system.

Policy 5.4.4
Preserve sections of original or early corrugated galvanised iron, including bolted fixings and flashings (now under new sheeting in limited areas of Bays 1 – 3 south)

Policy 5.4.5
Analyse deteriorated connections between gutters, trusses, columns and girders with the advice of a metallurgist.

Monitor roof louvres

Policy 5.4.6
Where original fabric survives, e.g. on Bay 2 monitor, preserve it and reinstate any missing elements.

Policy 5.4.7
Conserve the heavy gauge iron louvred sides through routine maintenance.

Roof Glazing

In any future major works assess the condition of the new clear lining the sides of the glazed roof monitors with a view to returning to the original detail.

The original roofs had extensive areas of glazing immediately below the monitor roofs. The configuration of this glazing remained only in Bay 15 west but this was removed in 1996. In most bays the area of roof lighting had been greatly reduced and located further down the roof slope prior to this. Early photographs indicate that the original system provided a high level of natural light.

Figure 7.18: Original skylight configuration, Bay 15 west. Source: Otto Cserhalmi, 1996.

Policy 5.4.8
Interpret the configuration and detail of the former roof glazing.

Policy 5.4.9
Reconstruct the roof glazing in the original configuration in an appropriate portion of the building (where it can be seen and appreciated by many), such as part of Bays 1 or 2.

Policy 5.4.10
In any future major re-roofing project consider reinstating the original configuration of the roof glazing.

Figure 7.19: Original configuration of glazing in Bay 15 west (old Bay 14). Photo: Jean Rice 1995.

Gutters & Downpipes

The original downpipe systems have been bypassed and a new system of plastic downpipes installed. The cast iron downpipes embedded in the brickwork in the east wall were badly deteriorated but remain in situ with well designed surface mounted downpipes replacing them. Original cast iron gutters column downpipes remain *in situ* but are no longer used because the underground drains serving them were blocked and the gutters were undersized according to modern standards. These features are unusual and significant and though they remain have not been conserved. It is not known whether they are stable or are continuing to deteriorate. The gutters can be inspected from crane rails and from scissor lifts, etc. to assess condition. Future stabilisation and repair may be necessary.

Policy 5.4.11
Examine the now redundant cast iron gutters in detail to assess condition, paying particular attention to junctions.

Policy 5.4.12
Monitor the now redundant embedded downpipes within the engaged piers to ensure they do not continue to rust and thus cause further cracking of the brickwork.

Policy 5.4.13
Consider reactivating part of the original stormwater disposal system in any future major works.

Policy 5.4.14
Interpret the original stormwater disposal system.

Trusses

The roof trusses are one of the most significant elements in the complex and require minimal intervention.

Policy 5.4.15
Conserve the roof truss system through maintenance. Monitor and treat corrosion if necessary, particularly at connections.

5.5 BRICK WALLS

Repair the north, west and south walls, as necessary and with minimal intervention.

Internal brick walls require minimal work and little work is required to external walls, except in Bays 1-4. Extensive works have already been carried out to the east wall. The tendency to 'clean up' the walls should be limited by these policies and by those on cleaning. Retaining features such as flues and brackets contributes to the historical interpretation of the place. Extreme care will be required with repointing, as it is a highly specialised and difficult task. Test panels and supervision are required to ensure correct mortar mixes, depth of repointing, cleaning of joints, etc. Masonry repairs were documented by Otto Cserhalmi & Partners for DPWS in 1998 but these have not been carried out.

Policy 5.5.1
Carry out repairs to masonry as detailed in the Building Fabric Inventory and documentation prepared by OC+P in 1988.

Policy 5.5.2
Repair cracked brickwork using materials to match the existing.

Policy 5.5.3
Do not reface or coat the surface of the damaged east wall unless investigation and testing reveals it is necessary.

Policy 5.5.4
Remove any plant growth after treatment with biocide according to specification and under supervision.

Policy 5.5.5
Remove damaging rusted metal elements as identified in the OC+P 1988 documentation and building fabric inventory and patch holes using non-damaging techniques. Non-damaging inserts and attachments should remain if they can be interpreted.

Policy 5.5.6
Main flues, hydraulic lines, fuel supply lines, etc. associated with the workshops function and located on the face of the building are not generally to be removed. Monitor and maintain metal elements not removed.

Policy 5.5.7
Preserve the large metal brackets of the former monorail attached to the north and west walls.

Policy 5.5.8
Do not bridge the asphalt damp-proof course by construction works or raised ground lines. The damp-proof course is located above the stone-base course and appears to be functioning well.

Policy 5.5.9
Ensure that repointing of masonry is done in lime mortar to match existing, do not use cement.

Policy 5.5.10
Consider bricks from within walls as a source of replacement bricks if required for external walls, e.g. where external bricks are missing. Turning bricks may be appropriate in limited areas but is unnecessary on a large scale.

Policy 5.5.11
Materials, such as bricks, may be refused from stockpiled former railway buildings where there is a match.

Policy 5.5.12
Aim to have new bricks matched both in colour and shape of the existing. Note that this includes dry pressed sandstock bricks for the body of the wall, a different brick below the stone plinth, tapered white bricks and tapered brown bricks in the arched openings.

Figure 7.20: Asphalt damp-proof course. Source: PWD 1995.

5.6 STONEWORK

Assess and make safe parapet capping and cornice and repair or replace as necessary.

The stonework is integral to the wall, with the plinth and cornice extending through the brickwork. Stone replacement is costly and involves the removal of original fabric. The policies are directed to provide for the minimum work necessary. Stone repairs have been documented as detailed under masonry.

Policy 5.6.1
Conserve the cornice and parapet as detailed in the OC+P 1998 documents and the Building Fabric Inventory.

Policy 5.6.2
Ensure that all repair or replacement work to the sandstone carried out by a skilled stonemason under the guidance of a conservation architect.

Policy 5.6.3
Repair stone *in situ*, where possible.

Policy 5.6.4
Replace stonework only if physically or structurally unsound. Replace the minimum possible stonework. Where stones are removed, protect the wall below from water entry and replace with minimum delay.

Policy 5.6.5
Replacement stone is to be good quality stone, matching the existing in colour, durability and texture. Seek independent expert advice on stone selection prior to the purchase of stone.

Policy 5.6.6
To restore the function and appearance stone, repair by epoxy patching, or other proven technique, rather than replace. Do not use cement. Patching must be tightly specified and supervised, and executed by a skilled professional. The extent of patching versus replacement has been assessed carefully by a conservation architect and a stonemason for the documentation already prepared.

Policy 5.6.7
If there is minor physical damage, repoint open mortar joints and install over flashing to the stone cornices and parapet capping rather than replace (see documentation).

Policy 5.6.8
Remove rusting steel inserts and patch *in situ*. Preserve cast iron toggles.

5.7 CLEANING

Clean building fabric carefully and only as necessary for conservation or removal of intrusive coatings.

Overcleaning of the east wall in the past has irrevocably damaged the brickwork. Cleaning has the potential to damage the face of brick and stone and must only be done with careful consideration.

Policy 5.7.1
Do not overclean the original building fabric.

Policy 5.7.2
Using proven techniques, clean only as necessary to remove damaging chemicals and pollutants or paint (e.g. where accretions are removed) and to allow paint finishes, etc. to adhere to the walls.

Policy 5.7.3
Testing and sample panels are required before cleaning bricks and stone to assess if it is necessary or desirable and to develop appropriate and effective methods. Testing is to ensure that cleaning or finishes are not harmful to the fabric.

Policy 5.7.4
Do not apply graffiti coatings or water repellent coatings to face brickwork and stonework (see Policy 5.10.5).

Figure 7.21: Testing a sandstone cleaning method on a small square of sandstone sill. Source: Otto Cserhalmi 1996.

5.8 DOORS AND WINDOWS

Maintain original and replacement timber doors and cast iron windows as recommended in detail and limit insertion of new openings.

Most of the significant windows and doors were conserved during the adaptation for the ATP. The majority of original windows have a cast iron frame with a semi circular head, the frame built into the brickwork and located centrally in each bay. Most brickwork bays have existing windows in all locations that are consistent with the design of the place. The windows added for the Bay 15 mezzanine are timber. Ground floor timber doors with wicket gates are (or were) in the centre of each bay and Row 7. The patterns of doors or windows in each bay or row are part of the design of the building. The original doors were removed in the early 20th century and then the openings to the traverser bays were infilled. Intrusive infills were removed during adaptation for the ATP and modern glazing and doors installed.

Policy 5.8.1
Conserve all windows as detailed in the building fabric survey including original and replacement cast iron windows.

Policy 5.8.2
Maintain cast iron windows to prevent their corrosion.

Policy 5.8.3
Monitor fixings of cast iron windows which are embedded in the brickwork and treat for corrosion if cracking is evident.

Policy 5.8.4
Minimise damage to brickwork during treatment of cast iron windows including protecting it if abrasive blasting is used to treat the metal window frames.

Policy 5.8.5
Do not make new window openings unless essential for conservation or compatible use. On the ground floor match new openings to the existing. Relate upper level openings to the brickwork panels (as in Bay 16 south – old Bay 15) and do not place in pediments.

Policy 5.8.6
Preserve the high level windows, located in the mezzanine area of Bay 16 (old Bay 15) as they contribute to the historical interpretation of the place.

Doors

Policy 5.8.7
Maintain new and replacement timber doors including patching with timber and/or epoxy and painting.

Policy 5.8.8
Repairs are to be by a joiner skilled in conservation work.

Policy 5.8.9
Retain ironmongery and if new items are required place them above or below the existing.

Policy 5.8.10
Retain main entries in the traverser bays i.e.. Bay 8 (old Bay 7) and Bay 14 (old Bay 13) and in Row 8 (the centre row).

Policy 5.8.11
New door openings are not be made except for required escapes. Match the detailing of existing openings in any new door opening. Existing windows now converted to doors or large openings may be retained as doors or large openings.

Figure 7.22: The high level windows such as those in Bay 16 (old Bay 15) contribute to the historical valueof the building (see Policy 5.8.6). The photo shows the north face of the Locomotive Workshops with the Presentation Centre in the near background. The Running Sheds were located in front of the maintenance sheds in the far background. Photo: Istvan Czehmester, 2002.

5.9 INTERIOR

Conserve structure, spatial arrangements and character when adapting to new use and inserting new elements.

Through Links

The building plan originally had a central (rail) road in Row 8 which linked to the rail system. The major cross links were in the traverser bays, that is, Bays 8 & 14 (old Bays 7 & 13), although the traversers were removed in 1901 & 1922 respectively. Subsidiary cross links were in all other bays except Bays 5,6,8, 14 & 15. It is important to maintain some of these links to interpret the former use of the place. This was recognised in the adaptation of the ATP, which includes Row 8 as the major longitudinal pedestrian access and Bay 8 as a major entry.

Policy 5.9.1
Retain Row 8 and Bay 8 (old Bay 7) as through links.

Columns

The column grid is integral to the building and is one of the generators of the building's form. Retain columns and use the grid to guide planning within the space. Plan within bays rather than across bays. In the past columns have been used to support service lines via brackets and line shafts and cranes. It may be appropriate to support new features from the columns and associated structure. The structural capacity to do so has not been established and should be investigated on a case by case basis. Some columns show evidence of subsidence but have now been underpinned.

Policy 5.9.2
Preserve the column grid and columns.

Policy 5.9.3
Base new designs on the column grid.

Policy 5.9.4
Investigate load bearing capacity before using columns (or walls) to support new loads. Continue the aesthetic approach, of hanging new services and structural elements from the existing structure, adopted during the adaptation for the ATP.

Policy 5.9.5
Investigate the original finishes to the columns and consider reinstating them in the future.

Girders and Crane rails

Girders and crane rails are an integral part of the structure and are important to its interpretation. Raising crane rails as in Bay 6 north (in the past), to gain headroom destroys the ability to determine how the cranes operated and the ability to operate them. Girders, which originally supported line shafts, can be removed without compromising the structure, but reduces interpretability. It is preferable not to remove these girders as they indicate where the line shafting was located. The girders to Bays 10 – 14 (old Bays 9 – 13) were removed during the adaptation for the ATP and stockpiled.

Policy 5.9.6
Investigate where the girders from Bays 10 – 14 are stockpiled.

Policy 5.9.7
Consider reinstating the girders in Bays 10 –14, especially where they can be used to demonstrate their original purpose (to support line shafting) and where it can be useful to support services on new installations.

Policy 5.9.8
Conserve crane rails and girders in their original locations, i.e. as elements of the original structure and to retain the potential for reuse of the cranes in each bay.

Policy 5.9.9
Use crane rails and girders to support new features, subject to consideration of the ability to provide structural support and aesthetic compatibility, and without hindering the potential for future reuse of the cranes.

Figure 7.23: Bay 12 looking north. The crane is supported by the crane rails on either side. Original light fittings are still *in situ* on either side of the third row from the front (see Policy 5.11.2). Photo: Istvan Czehmester 2002.

Floors and Sub-floor Spaces

The original floors included a range of industrial finishes, from concrete to bare earth. A new concrete slab was installed throughout the building when adapting it for the ATP, except for Bays 1 & 2. The rail lines have been retained under a concrete slab and carpet which shows the location of the rail lines in the pattern. There are opportunities to display these rails for interpretation.

Policy 5.9.10
Bays 1-4 are on piles, some now underpinned. Do not apply heavy loads, such as earth moving machinery close to the walls and columns.

Policy 5.9.11
Retain and regain the industrial historical character of Eveleigh Railway Yards by using industrial floor finishes for new work. A polished concrete finish is preferable to the carpet now in public spaces.

Policy 5.9.12
During future work do not remove the original rails which are on site under the concrete slab. In Row 8 retain the rail lines now under the concrete slab, consider future opportunities to expose them, and better interpret the rail lines e.g. using metal strips mounted in the concrete slab, or glass strips over the excavated rails.

Policy 5.9.13
Do not remove remains of pits and machine footings in Bays 5 – 16 (Bays 4a-15), now overlaid by a new floor.

Figure 7.24: Bay 10 - 14 (old Bays 9 - 13) Engines were moved along the length of Bay 8 (old Bay 7) or Bay 15 (old Bay 14) by the traverser and then across Bays 10 - 14 along the rails exposed in this photo, to where they would be worked on. Photo: Otto Cserhalmi, 1996.

Policy 5.9.14
Preserve below ground pipes, for example the air supply lines from the Rootes blowers in Bay 1.

Policy 5.9.15
Protect below ground features when installing underground services. Seek advice from an industrial archaeologist if in doubt.

Policy 5.9.16
In general, do not remove old pipes even if they are not currently working. Removal, in part only, should be considered only if it is essential for conservation work or compatible use.

Mezzanines

All existing mezzanines are additions but some have moderate heritage value e.g. that in Bay 16 North (old Bay 15). Mezzanines are a practical way to add more floor space to the building but interrupt the large spaces and open character of the interior of the building. Use the existing ground level floor space in preference to mezzanines. Mezzanines were added for the ATP in Bays 3 to 9 (old Bays 3 – 8) and have recently been added in Bay 15 (old Bay 14). They are designed to be able to be removed in the future without damaging significant fabric. Do not add further mezzanines, especially to Bays 1 & 2 and 10 – 14 which are the only Bays retaining their open character.

Policy 5.9.17
Preserve the open character of Bays 10 - 14 and Bays 1& 2 including minimising the addition of mezzanines. Retain the mezzanines in Bay 16 (old Bay 15) south.

Policy 5.9.18
In any alterations to new mezzanines, have regard to the original design principles. The design of mezzanines aims to minimise the interruption of the space and allow the existing structure to be visible. They run along bays and at the end of bays (rather than across multiple bays) so that the lattice girders and crane rails are not affected and to reflect the patterns of use for which the building was designed.

Policy 5.9.19
Internal additions and alterations to mezzanines must not interfere with the trusses in height, the suspended services, nor the ability to run new suspended services. Minimise interference with the existing cranes, and crane rails.

Elevated Walkways

Historically there were some elevated walkways providing access across bays and linking walkways which run between the double columns. There were also toilet facilities at a higher level off walkways and supervisor's offices. In Bays 1 & 2 no elevated walkways should be added unless required to operate machinery or interpret operating machinery. In Bays 10 - 14 elevated walkways may be added to enable a compatible use or to facilitate operation of cranes. Such additions should not be like those in Bays 3 - 9 which enclose the spaces over but should have visually open balustrades without roofs/ceilings or walls.

Policy 5.9.20
Elevated walkways may be introduced in Bays 1 & 2, if necessary to allow public access for the interpretation of operating machinery.

Policy 5.9.21
Elevated walkways, no more that 25% of the floor space, may be introduced in Bays 10 - 14 if necessary for otherwise compatible use, but should be open without roof or walls. See also Policy 5.9.19.

5.10 FINISHES

Use appropriate industrial finishes for existing fabric and modern finishes for new work.

The place has a range of industrial finishes which were analysed during the adaptation for the ATP, such as the black finish to trusses and cranes. The simplicity and nature of the finishes are an important element in the industrial character of the building and contribute to the cultural significance of the place. Stabilise painted signs and graffiti with products such as “Paraloid” and paint with a conservation treatment, such as Rap primer if necessary.

Policy 5.10.1
In any future conservation work retain the traditional finishes of the building.

Policy 5.10.2
Maintain and do not diminish the industrial character of finishes.

Policy 5.10.3
Areas of traditional painted finishes may be painted over with like finishes, such as limewash with limewash.

Policy 5.10.4
Employ specialist tradespeople under experienced supervision to apply old finishes such as limewashing or lacquering (see also Policies 2.2.9 & 2.2.10).

Policy 5.10.5
Stabilise painted signs and graffiti with conservation treatments and do not overpaint (see also Policy 5.7.4).

Policy 5.10.6
Do not overfinish so that the place looks new.

Policy 5.10.7
Use modern finishes for new work to distinguish new from old and do not apply finishes to deliberately make new work look old (Articles 1.5 & 22.2).

5.11 SERVICES

Retain significant early services and expose and suspend new services according to the building's structural grid.

Policy 5.11.1
Retain remnants of early twentieth century wiring, insulators and associated elements.

Policy 5.11.2
Retain all remaining early light fittings (the majority have already been removed).

Policy 5.11.3
Expose and suspend new services from the existing structure in the manner of past services. Devices such as cable trays are recommended. Burying, chasing or covering services in false work is intrusive, unnecessary and undesirable.

Policy 5.11.4
Relate installation patterns of new services to the grid pattern of the building and do not locate them indiscriminately.

Figure 7.25: Hydraulic system. Low pressure return pipe supported on a purpose designed bracket to the left of a column between Bays 1 & 2. This is an example of how early services can be retained and incorporated into the requirements of the new. Photo Otto Cserhalmi, 1996.

Figure 7.26: Two types of porcelain insulators on the north wall of the building at Bay 5 and its adjacent pilaster. Photo: Istvan Czehmester 2002.

6.0 EVELEIGH LOCOMOTIVE WORKSHOPS MACHINERY POLICY

These policies for the machinery do not stand alone but should be considered in relation to the preceding general and building policies.

Preamble

The following conservation and maintenance procedures are guidelines only. Detailed information on the relocation, interpretation and conservation of the machine tool and spring making collections is contained in the study undertaken concurrently "The Conservation and Interpretation of Machinery from Bays 1 & 2, Australian Technology Park". Any work on any of the machinery in Bays 1-2 should be supervised by a skilled practitioner in consultation with an industrial archaeologist. It is likely that unforeseen conservation problems will arise when machinery is being conserved as the interior of the machines and underground components can't be readily inspected. Systems, collections and assemblages of machinery, tools and equipment hereinafter referred to as machinery.

The machinery in Bays 1- 2 fall into several categories of deterioration, each of which requires a different method of preservation and maintenance. The items in the workshops at present can be divided into the following categories of deterioration:

- heavily externally rusted, unpainted blacksmiths' tools and partially completed work
- machines that exhibit external, superficial rust on painted body parts as well as external driving mechanisms and moving parts normally kept oiled or greased during operational life
- machines that have corroded internal power or driving components or components which require preventative maintenance
- machines and equipment belonging to the steam system which may contain water in internal surfaces, valves, cylinders and piping
- machines belonging to the hydraulic system which may contain water in internal valves, pipes and pistons.

6.1 GENERALLY

Conserve, in situ*, the extensive systems, collections and assemblages of machinery, tools and equipment in Bays 1 & 2 (including those in the annexe), the isolated remaining machines and the cranes in Bays 3 - 16, items adjacent to the building such as turntables and pressure vessels. Conserve machinery moved to Bays 1 & 2 and move to a more appropriate location.*

Some one hundred and twenty three items remain *in situ* in the workshop Bays 1 & 2. Other items have been moved to Bays 1 & 2 from elsewhere and others e.g. wall cranes and overhead travelling cranes remain *in situ* in Bays 3-16. Machinery should generally be displayed in its original location and not be mixed with machinery to which it is unrelated. In Bay 2 unrelated machinery is stored in between the *in situ* furnaces making it extremely difficult to understand how this workshop operated. Some of this machinery was relocated to Bay 10 in 2002, under the supervision of a machinery conservator. Significant machinery not in its original location should be displayed in a location where, or close to where, it was originally located or may have operated.

Policy 6.1.1
Conserve all significant fabric by preservation and restoration, and only where absolutely necessary by reconstruction or adaptation. Preservation is required in the short term and restoration or adaptation in the long term. As many relics are operational, or were when the workshops closed, reconstruction may only be considered for a few relics.

Policy 6.1.2
Conserve *in situ,* machinery presently in its original location, whether it is operating or static.

Policy 6.1.3
Display machinery not in its original location as close as possible to its original location and interpret the original location.

Policy 6.1.4
Protect all significant machinery and elements of machinery (e.g. traverser cabin) from moisture.

Policy 6.1.5
Use existing detailed studies where items are to undergo restoration, reconstruction or adaptation. Consult a machinery conservator and former operators, etc.

Policy 6.1.6
If any significant machinery it to be moved from its present position it will be necessary to gain Heritage Council approval, prepare a complete report on its condition and make an archival record prior to moving.

Policy 6.1.7
Permanently affix a tag to any machinery proposed for movement. The tag is to state; 'Machinery from Eveleigh Locomotive Workshops. Heritage Item', and should include a reference number to an inventory sheet and the Management Plan for Moveable Items.

Policy 6.1.8
Do not remove any part of any assemblage, system or collection from the parent item. This includes all tools, stands and operating equipment.

Policy 6.1.9
Catalogue and annotate any records found on site and lodge with the State Archives Office. Keep copies of relevant material at a secure but accessible location on the site.

Policy 6.1.10
If removal of any machinery off-site is unavoidable consider locating elsewhere within the Eveleigh Railway Yards.

6.2 MAINTENANCE INSPECTIONS

Carry out inspections for corrosion and maintain anti-corrosion measures.

It is essential that regular inspections are made to ensure that anti-corrosion measures are not allowed to break down. The inspection is to follow guidelines for the protection of decommissioned machines. It will be necessary to keep a diary of inspections and protective measures taken for each machine.

Policy 6.2.1
Each machine is to be inspected at 12-month intervals.

Policy 6.2.2
Commence and keep a diary of maintenance inspections and treatment of each machine. Keep with a copy of the CMP.

Policy 6.2.3
Undertake conservation procedures including treatment of corroded areas, where and as necessary during the inspection.

6.3 CLEANING

Clean as necessary to allow conservation action.

In some cases machinery will have to undergo several distinct preservation measures. In most cases machinery must be free of dust, oil and grease before any surface preservation can take place. Although some of the present oil or grease is helping to conserve this equipment, in other cases it is hiding corrosion.

Policy 6.3.1
Clean all machinery, which has any surface grease with a solvent or, alternatively, a medium pressure steam clean with a light detergent additive. This will include almost all of the machinery, cranes and engines.

Policy 6.3.2
Steam cleaning must immediately precede subsequent surface finishing and extensive time delays between any treatment and the next must be avoided.

Policy 6.3.3
Thoroughly force dry elements which have been steam cleaned and use a water dispersant prior to an application of a preservative.

6.4 EXTERNAL SURFACES

Treat external surfaces according to existing finish and condition and according to individual recommendations.

Many items, such as forge tools, partly finished jobs, blacksmiths' tongs, furnace tools and tool racks have a complete layer of rust over them. Corrosion has occurred on many of the relics within the workshops but in many cases is confined to the external surfaces. Policies cover the treatment required according to the condition of surfaces. Most require treatment with phosphoric acid and it is believed that most of the items within Bays 1 and 2 have, in fact, been treated in this way. Phosphoric acid should not be used on painted surfaces if the paint is to be preserved. Painting is only recommended in some cases and it is preferable, in many instances that the machines remain in their present state with a surface preservative sprayed on for protection.

Policy 6.4.1
Treat external surfaces in order to preserve them, predominantly with a preservative.

Policy 6.4.2
Repaint some machines. This is only to be done where recommended by and in accordance with any detailed studies for individual machines, or machinery conservators advice.

HEAVILY RUSTED, UNPAINTED

Policy 6.4.3
Remove any deep or flaking rust with a wire brush.

Policy 6.4.4
Spray the surface of all machinery in this category with a commercial phosphoric action solution such as Tannic acid. Before spraying it is essential to ensure that all surfaces are free from rust and completely dry.

LIGHTLY RUSTED, UNPAINTED

Policy 6.4.5
Thoroughly wire brush the rusted areas and remove all traces of rust. Remove flaking or loose paint by brushing.

Policy 6.4.6
Wipe the whole surface clean with a solvent and then sprayed with a preservative such as Ensis STD. This agent puts a seal over the surface, which will then last for two years without further attention and after which time it should be inspected.

Policy 6.4.7
In moist areas use a water dispersant two hours before spraying with preservative

PAINTED AND FLAKING

Policy 6.4.8
Partially or completely remove the existing coat of paint using flame and wire brushing where recommended by an individual conservation plan.

Policy 6.4.9
Coat the exposed surface, while still warm, with a zinc phosphate primer following at specified intervals by two coats of high gloss enamel.

6.5 INTERNAL SURFACES

Treat internal surfaces for corrosion.

Corrosion, which occurs on external surfaces, is relatively easy to treat. The rust in most cases is superficial and is easily stabilised. Corrosion on internal surfaces, on valving or on electrical power sources such as motors and transformers is less easily diagnosed and remedied and usually requires a thorough inspection through physical intervention.

Policy 6.5.1
Remove oil and grease from external gear wheel trains, drive shafts, bearings and clutches for close inspection, prior to treatment with preservatives.

Policy 6.5.2
Top up gearboxes and sumps with oil initially and then finally strip and clean prior to further conservation measures as recommended in a CMP.

Policy 6.5.3
Following the completion of cleaning and surface protection measures, regrease all bearings and moving parts such as gears, covers, handles to ensure they do not seize.

6.6 PROVISION OF STEAM AND POWER

Provide steam and power to enable conservation measures to be carried out.

Recommendations were made to the SRA to have the equipment contained in the workshops treated prior to the closure of the workshops. It is not known which, if any of the remedial actions contained in the report were carried out. At the stage when the recommendations were made the boilers were still in commission and it was recommended that they should be fired and that the total system be brought into operation. In this way all of the pipes, cylinders and pistons, that would have been thoroughly heated, could have been dried and preserved.

Recent inspections reveal that the boilers are no longer in commission and it is doubtful if they could be returned to operational condition without massive amounts of work. Steam is required to preserve the equipment in the steam system as recommended in the following policies. DC power is required for the overhead travelling cranes (Godden, Relics Policy, 1988).

Policy 6.6.1
Supply temporary steam power to the workshop by introducing a portable boiler to the steam system and preserve the steam system as in the following policies.

Policy 6.6.2
Provide temporary DC power to overhead travelling cranes to enable their conservation and use.

Policy 6.6.3
Permanently provide steam, DC power and/or other alternative power source where it is required to enable operation of machinery for use of interpretation in the long term.

6.7 BOILERS

Preserve fireside and steamside of boilers.

The following recommendations were made in the 1988 and 1995 reports. In the intervening years since those reports were written, the deterioration of the boilers has not been monitored. It is not clear whether the following policies will be able to be carried out. If possible, the boilers should be surveyed, recommissioned and the 1988 recommendation followed. These recommendations are for the initial conservation and stabilisation of the boilers. They will subsequently require regular inspection and maintenance.

Policy 6.7.1
Investigate the boilers in detail to assess condition and whether the following detailed policies can be implemented.

Policy 6.7.2
Arrange a complete inspection of the boiler with a licensed boiler inspector. Once this has been carried out amend the recommendations for the conservation of the boilers.

Policy 6.7.3
Fire the boilers and severely ‘blow down’ the boiler, while still under fire, to reduce the dissolved and suspended solids to a minimum. Pressure inject an amine solution, (a combination of a neutralising amine and a filming amine), into the steamside of the boiler. Operate the engines and hammers connected to the steam system. Add further amine solution to the boiler with the feedwater.

Policy 6.7.4
Lower steam pressure at the steamside of the boiler. Close down and drain steam lines. Open the condensate cocks on all engines and the steam hammers to release any condensate. Open all condensate cocks on the steam lines.

Policy 6.7.5
Completely dry the steamside of the boiler with a warm air fan if necessary. Place silica gel inside and completely seal.

Policy 6.7.6
When the boilers cool, thoroughly clean the fireside system with sodium carbonate solution to neutralise acidic residue.

Policy 6.7.7
Dry the fireside system with a hot air blower and coat with Cortec 307, (or equivalent), sprayed throughout as a powder

Policy 6.7.8
After preservation treatment inspect and maintain regularly.

6.8 STEAM DRIVEN MACHINERY

Preserve key items of machinery including steam engines and hammers, the hydraulic system and the Davy Press.

A steam source is required to carry out initial preservation measures. As mentioned above this may be done through the introduction of a small portable boiler. Undertake a complete and thorough inspection of the hydraulic system. If the condition of the system is assessed as operable the following conservation procedures should be followed. There are eight presses connected to the hydraulic system in Bays 1 and 2 These policies cover preservation and further conservation procedures will have to be undertaken if the system is to be reactivated and used as a demonstration unit or used by an engineering firm. The Davy Press is one of the most important individual items of machinery at Eveleigh, and in Australia, and is likely to have water in reservoirs and tanks, which will cause corrosion.

Steam Engines & Hammers

Policy 6.8.1
Bring the steam engines, including the Rootes Blowers and the Steam Hammers, into operation.

Policy 6.8.2
Allow the machines, engines and pipes to dry out. Coat the whole of the internal working surface of these items with a film of amine rust preventative (see Policy 6.7.3). They should then be resealed.

Policy 6.8.3
Arrange for inspection of the hydraulic system.

Policy 6.8.4
Drain any water presenting in the reservoir and the system. Refill the reservoir with clean water and activate the hydraulic system by operating the electric pump

Policy 6.8.5
Operate each of the presses to ensure that the whole system is flushed out.

Policy 6.8.6
Drain the water a second time and fill the reservoir with clean water. A water displacement additive such as Shell Ensis fluid SDA should be thoroughly mixed with the water. Operate each press sufficiently to ensure that the additive passes through the system. The degree of diffusion of the displacement additive through the system will have to be tested on each machine.

Policy 6.8.7
Drain completely and reseal the system. The additive will protect the internal systems for up to two years, after which it should be inspected regularly.

Policy 6.8.8
Examine the Davy Press for excess corrosion throughout its whole system. This especially applies to the steam reservoir and the backup system.

Policy 6.8.9
Reactivate the Davy Press using an external steam source (along with all the other steam equipment). Treat any water in the reservoir or pressure tanks with a water displacement additive such as Shell Ensis fluid SDA. It is important that the water is then drained.

Policy 6.8.10
After preservation inspect and maintain both operating and non operating steam driven machinery.

Figure 7.27: Photo of the Davy Press in Bay 1 taken after the workshops closed down. Note the original, early roof configuration allowing for more natural light penetration. Source: Otto Cserhalmi, 1996.

6.9 RELOCATED MACHINERY

The relocated machinery should be treated with preservative in the short term and conserved in former locations or in a new location, in the long term.

Some 21 items were moved from other areas to Bays 1- 4 to protect them when the area was turned over to Paddy's Markets. They were subsequently moved into bays 1 & 2. There is superficial rust on most of these pieces including on the lathes and drills. Note that some of the machinery has been relocated several times during its history while the workshops have been expanded and the bay functions changed.

These items have been examined in a detailed study prepared concurrently with this conservation management plan and reference should be made to its detailed findings. The detailed study recommends where to locate these items and some were relocated to Bay 10 in early 2002.

Policy 6.9.1
Subject to the general policies and detailed studies for each machine, options for already relocated machinery are:

- move back to original position and make operational
- move back to original position as a static display
- locate in a bay close to its original location or as part of a general machinery interpretive display and make operational
- locate in a bay close to its original location as static display

Policy 6.9.2
Preferably clean with solvent rather than with high-pressure water or steam

Policy 6.9.3
If there is any moisture present on this equipment it must be sprayed initially with water repellent then later with the preservative.

Policy 6.9.4
After treatment with water repellent it is important that the whole surface is coated with a preservative such as Ensis STD.

Policy 6.9.5
Do not move 'antique' machinery from other sites to Eveleigh Locomotive Workshops unless it is as part of a temporary display or is necessary to interpret missing elements of the place. Clearly label machinery that is not part of the Eveleigh assemblage to distinguish it from machinery originating from Eveleigh Locomotive Workshops.

6.10 THE TRAVERSER

Conserve and interpret the traverser.

When the Locomotive Workshops closed, the traverser was located outside the building and was an important component of the workshops' operation and it, or one very similar, was formerly located within the building. In the mid 1990s it was removed from the traverser road, which was on the west side of the Locomotive Workshops, and was stored outside. The new road layout precludes the display of the traverser *in situ*. The site of the traverser road is still clear of buildings but now provides access to buildings in active SRA use and emergency egress and vehicle access for the Locomotive Workshops. The traverser has recently undergone detailed assessment and relocated within Bay 10 where it is proposed to be conserved and displayed.

Policy 6.10.1
Further investigate the history and operation of the traverser.

Policy 6.10.2
Conserve the traverser in Bay 10 and interpret its former location. It is preferable to place the traverser in a location where it was formerly, e.g. the traverser bays, Bay 8 or 14 (old Bay 7 or 13), and for it to be displayed with its rails at rail level and in a way that shows how it operated.

Policy 6.10.3
In any future major replanning in the area of the traverser road investigate the feasibility of conserving the traverser *in situ* while allowing emergency vehicle access. If feasible display the conserved traverser *in situ*.

Fig7.28: The external traverser track on the western side of the Locomotive Workshop. These tracks are still there, but now covered over. Photo: OC+P 1996.

8. STRATEGY

Generally detailed implementation recommendations are included with the policies. Aspects are summarised in the plans in this section. An implementation matrix has also been prepared for the policies.

8.1 DEVELOPMENT GUIDELINE PLANS

Plans have been prepared indicating development limitations, circulation in the building and fir interpretation. These are included at the end of this section.

8.2 IMPLEMENTATION STRATEGY

The matrix indicates when policies should be carried out, either short term, medium term or long term. Many items are ongoing and are to guideall parties on a continuing basis. Responsibility for implementation is also indicated using abbreviations as follows:

SHFA	The Sydney Harbour Foreshore Authority is the custodian of the site and has responsibilities to the community as a whole. The main office is at The Rocks
ATPPM	Australian Technology Park Precinct Management Pty Ltd is responsible for the conservation and development of the site. They control out the use of the site and its interpretation.
SRA	The State Rail Authority owns the machinery in Bays 1 & 2 and controls the rail network to which the site is connected and the buildings in active railway use to the west of the Locomotive Workshops.
ECW	The Eveleigh Carriage Workshops will have a new management organisation when it is redeveloped. The CMP calls for links between the management of the whole of the Eveleigh Railway Yards.
Proponents	Those undertaking works and construction projects in the building.
Designers	Architects, building designers, interior designers, exhibition and graphics designers, etc. responsible for design of projects in the building.
Conservator	Machinery conservation experts require for work on heritage machinery.
Users	Tennants, lessees etc of spaces in the building.

	Short term	Medium term	Long term	Comments
1 IMPLEMENTATION & MANAGEMENT				
Management & people to do conservation	SHFA/Hoff	Liaise all		Set up & approvals, cont. mngt.
Adopt Burra Charter approach				Guide all involved, generally
Apply CMP	Lodge	Apply	Research	esp. w ith w orks SHFA ATPPM
2 CONSERVING THE FABRIC				
Relate ELW to ECW		Liaise		SHFA, SRA, ATPPM ECW mngt.
Conserve building & authentic fabric				SHFA SHFA as building ow ner
Maintain ELW				SHFA & ATPPM
Conserve machinery & rails in situ				SHFA SRA ATPPM
Manage archaeology, don't disturb				When excavating ATPPM
3 CULTURAL IDENTITY				
Retain railway industrial landscape	Guides	Control / implement		SHFA ATPPM
Allow public access & involve community	Ongoing			SHFA ATPPM & community
Interpret ELW as a railway workshop	Fabric	Devices	Book	SHFA, Bay 1& 2 users
4 NEW WORKS				
Continue compatible use	Ongoing	Assess new uses		SHFA, users
Adapt for reuse but minimise change		Guide & control		SHFA, designers
Design new works to retain significance				SHFA, proponents, designers
5 BUILDING FABRIC POLICIES				
Record works		Before & of w ork		ATPPM/inventory proponents/works
Investigation fabric and test repair methods.				Before w ork, proponents
Monitor cracks, consider earthquake stability.		Monitor	Analyse	ATPPM
Conserve roof form & fabric and maintain		Ongoing		ATPPM
Reinstate roof details			APTPM	When undertaking major w ork
Repair brick walls				ATPPM
Repair or replace parapet capping & cornice				ATPPM
Clean fabric only as needed for conservation		Ongoing		ATPPM
Maintain timber doors & cast iron windows		Ongoing		ATPPM
Limit insertion of new openings		With new w ork		ATPPM SHFA
Conserve structure, spaces & character	When adapting & adding			ATPPM SHFA
Use appropriate industrial finishes for existing	When maintaining			ATPPM
Use modern finishes for new work.		With new w ork		ATPPM, proponents
Retain significant early services	Ongoing			ATPPM
Suspend services according to structural grid		When installing		ATPPM, proponents
6 MACHINERY - DETAILED POLICIES				
Conserve machinery in situ.	Ongoing			SHFA SRA ATPPM conservator
Inspection machinery for corrosion and treat it				ATPPM SRA conservator
Clean only necessary for conservation action				ATPPM Conservator
Treat external surfaces				ATPPM SRA conservator
Treat internal surfaces for corrosion				ATPPM SRA conservator
Provide steam & power for conservation work	When required			ATPPM
Preserve fireside & steamside of boilers.				ATPPM SRA conservator
Preserve steam engines and hammers.				ATPPM SRA conservator
Preserve the hydraulic system.				ATPPM SRA conservator
Preserve the Davy Press				ATPPM SRA conservator
Treat relocated machinery with preservative				ATPPM SRA conservator
Move relocated machinery in long term				SHFA ATPPM SRA conservator
Conserve and interpret the traverser				ATPPM SRA conservator

APPENDIX A

HERITAGE LISTINGS

APPENDIX B

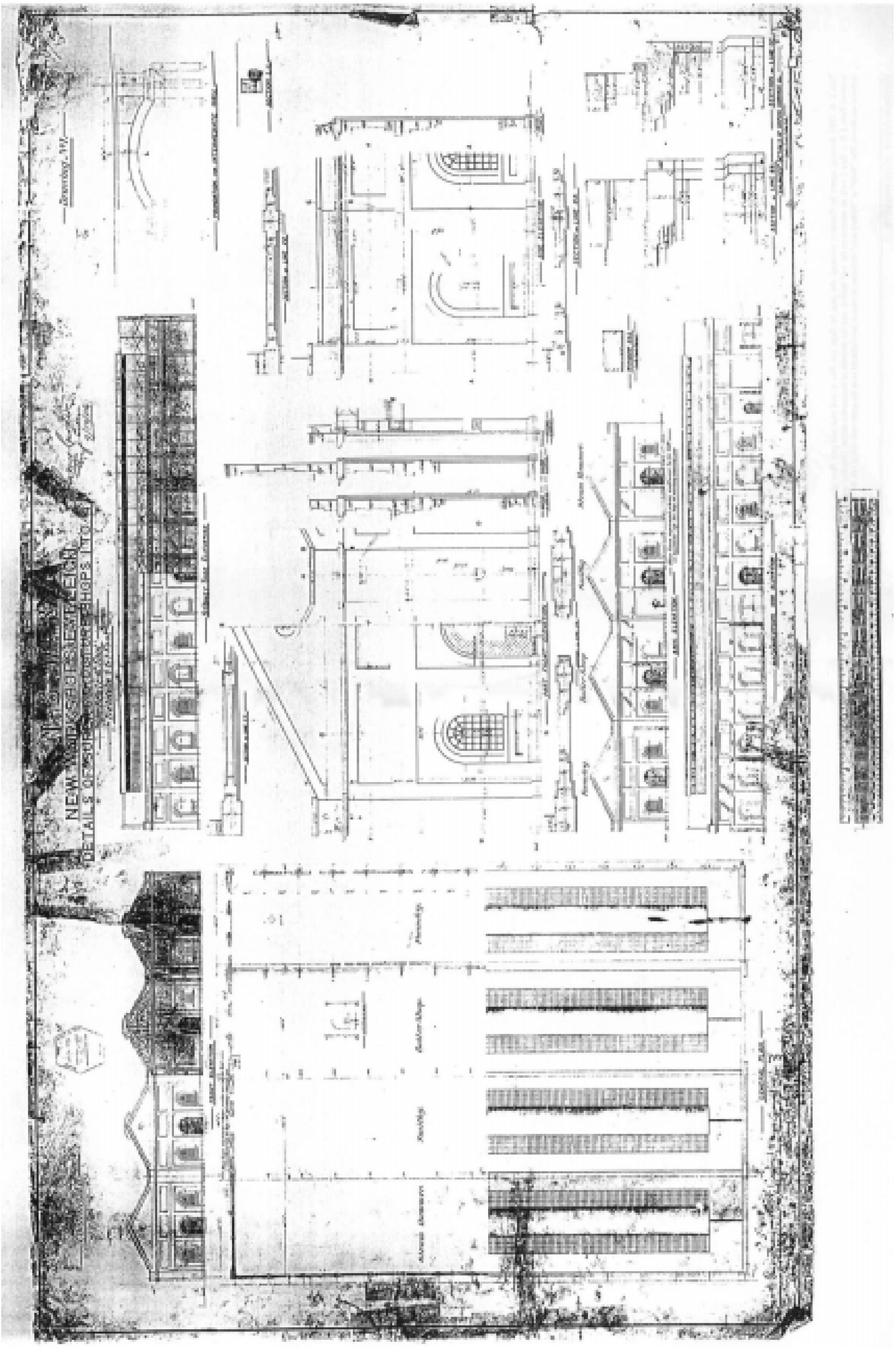
“STANDARD EXEMPTIONS FOR WORKS REQUIRING HERITAGE COUNCIL APPROVALS”

APPENDIX C

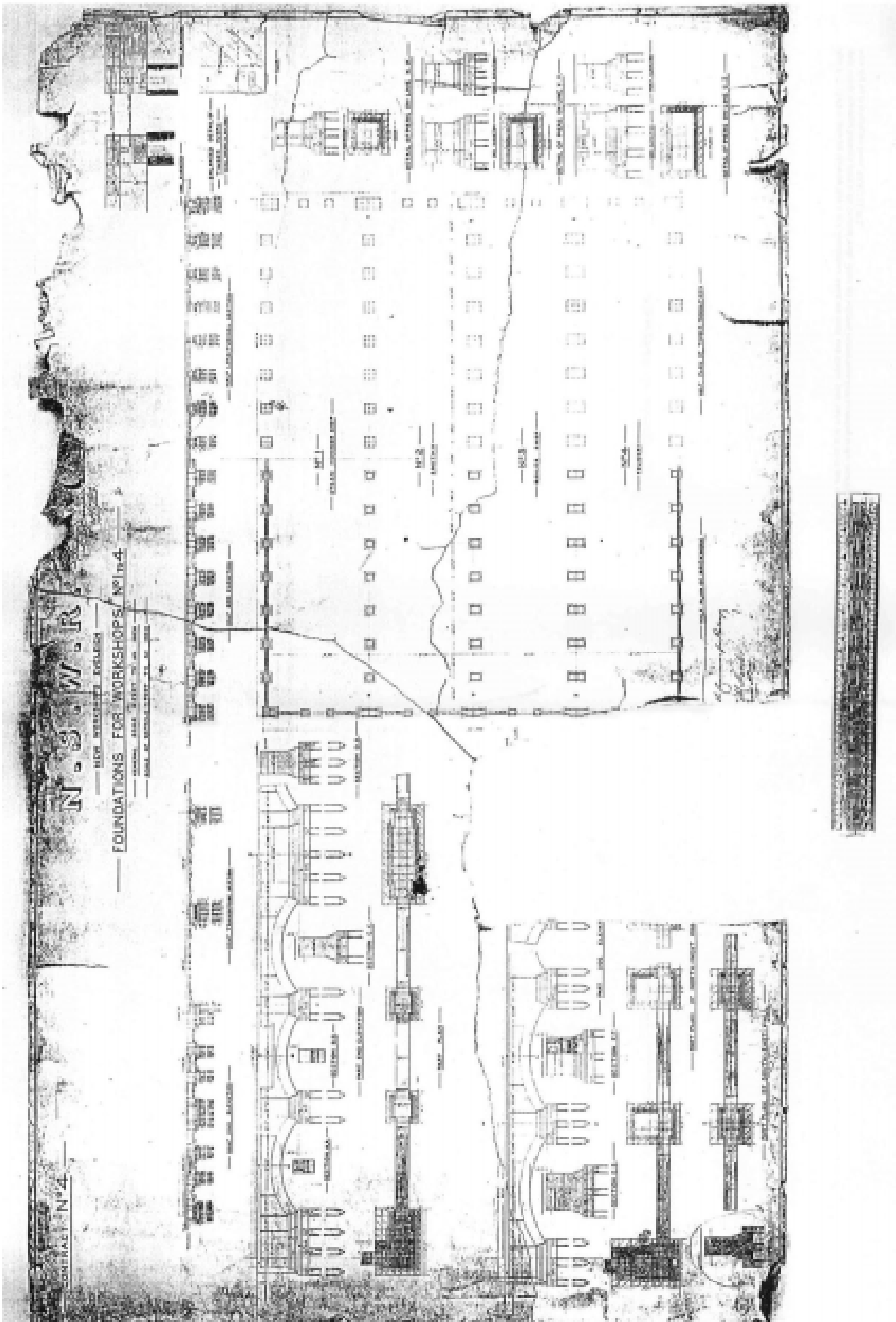
ATP PLAN OF TENANCIES

APPENDIX D

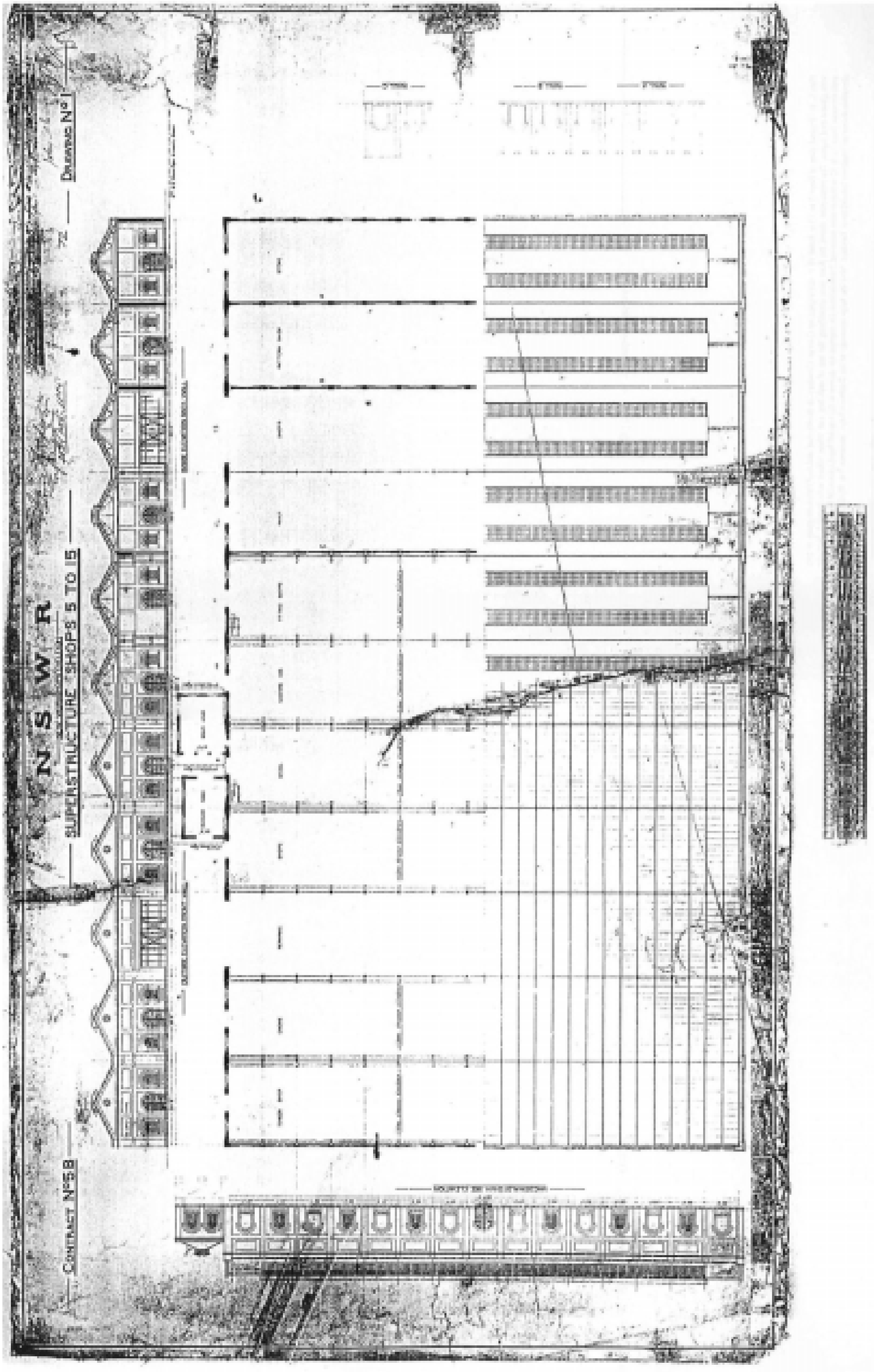
HISTORIC PLANS



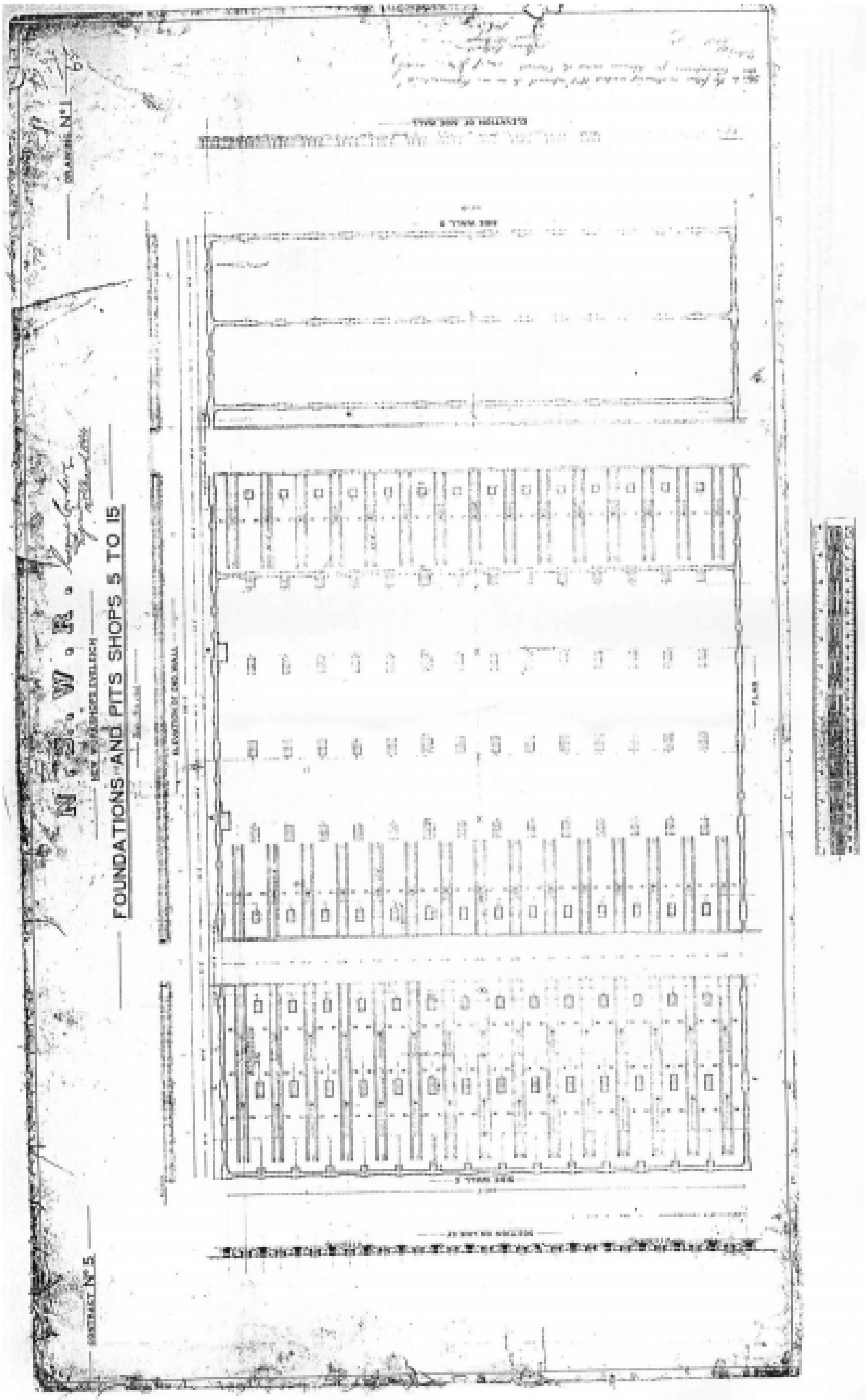
Plan A1: 1884 drawing signed by Cowdery showing the plan for Bays 1-4. Part is roof plan and part is floor plan. Note the wall between Bays 3 & 4, Bay 3 with no window in the wall behind, and the location of stormwater drains. Detailed wall elevation and sections are shown. The “Sydney Side” elevation is now referred to as the east wall. Source: SRAO ELW 3.



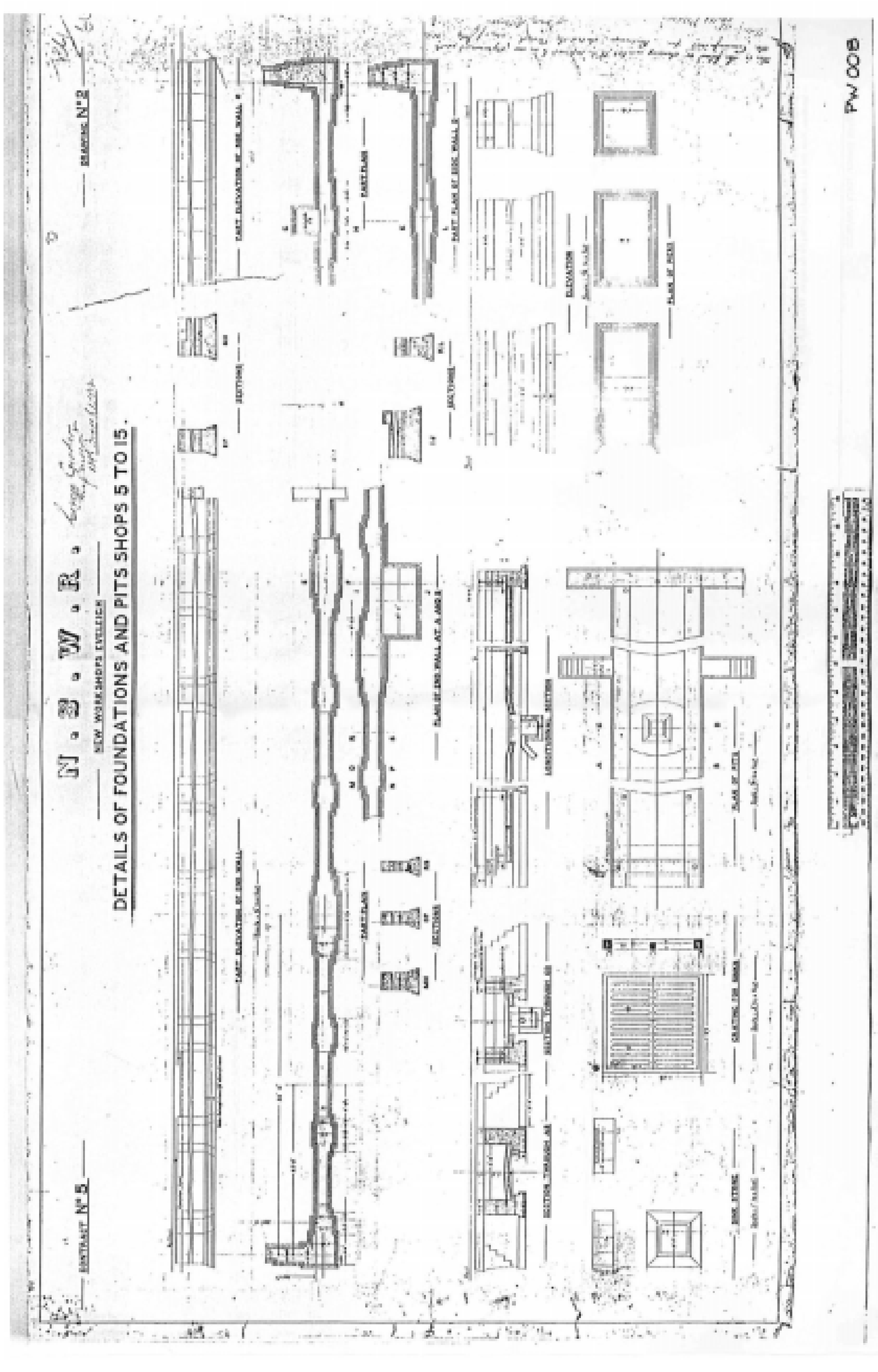
Plan A2: 1883 (?) drawing showing Bays 1 to 4 foundations which are brick with timber piers under each brick pier or column and brick arches spanning between piers in the external walls. These are believed to have been built according to this drawing but have not been dug up to investigate them. Source: SRAO ELW 2.



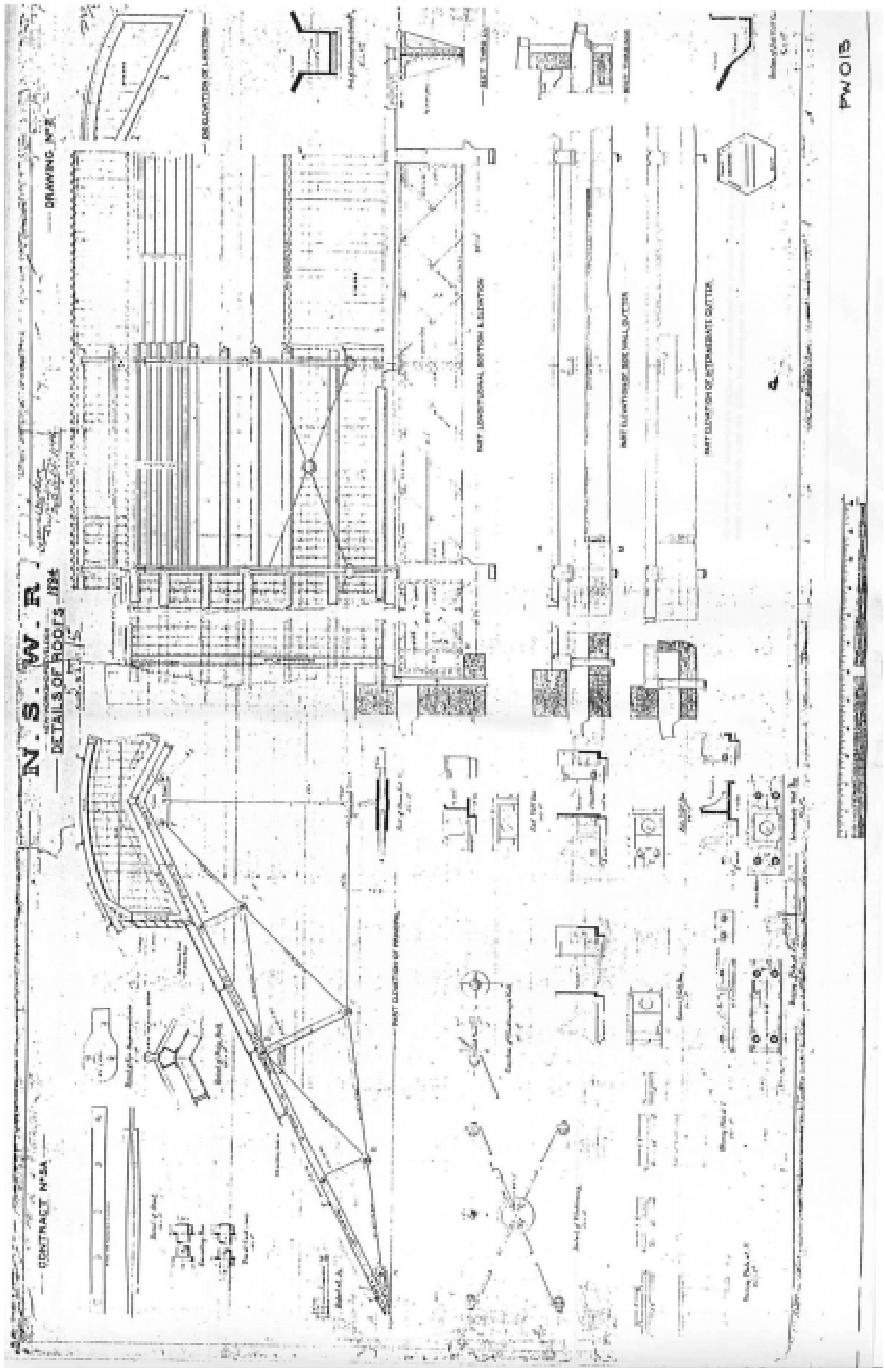
Plan A3: Original plan of Bays 5 to 15 is dated 1885 (?) and signed by Cowdery. It shows roof and roof structure plans in part with glazed roof lights. The remainder shows the floor plan identifying the use of each bay and where cranes were located. Note the wall between Bays 11 & 12 which is now removed. Foundatitions for engines are shown at the top left hand corner of Bays 9 & 11. The elevation shows no windows behind these footings. Note the large openings to the traverser bays, 7 & 13. Source: SRAO ELW 18.



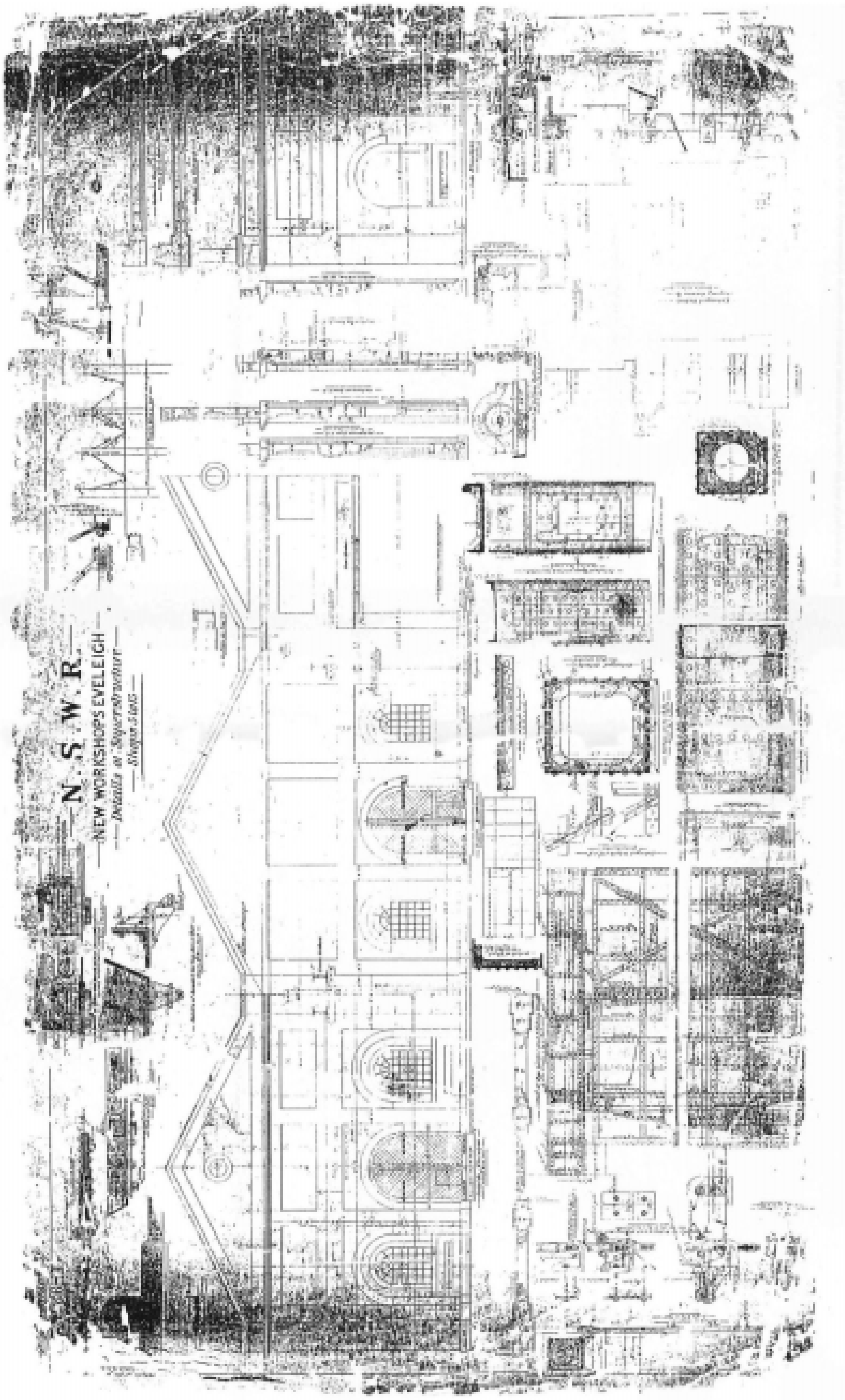
Plan A4: Plan of Bays 5 to 15 dated 1884 and signed by Cowdery. It shows the brick foundations to walls and under columns and a series of pits in Bays 5, 6, 8 & 12. The pits are dimensioned on the drawing, stairs down into the pits are shown and the location of stormwater drains are shown. Source: SRAO ELW 15.



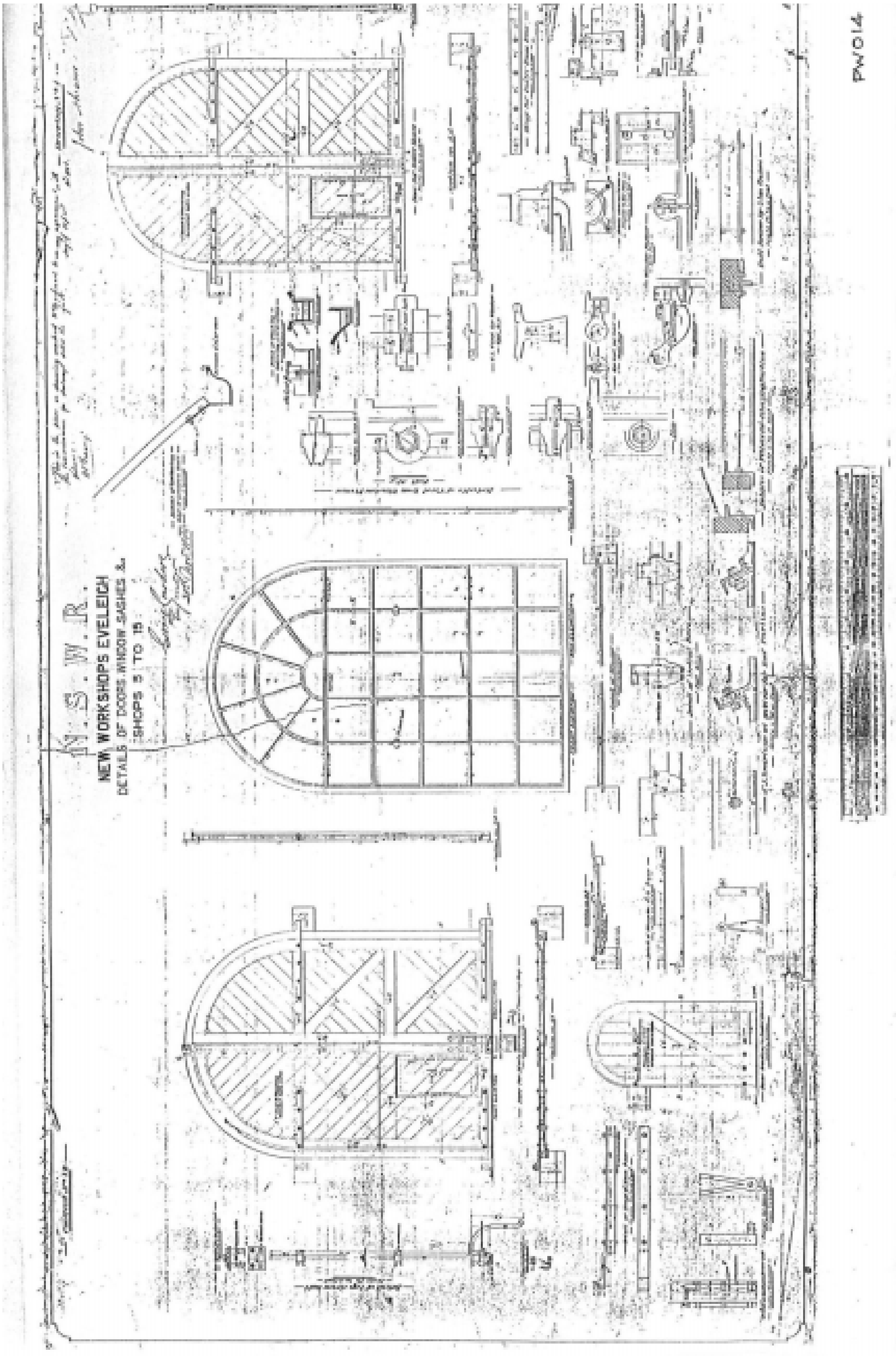
Plan A5: 1884 drawing showing the Bays 5-15 pits and footing in detail with detailed dimensions, 4 feet wide & 2 1/2 feet deep. Drains to pits are also shown. These pits probably exist below the surface at present and these drawings could be used to predict their locations. Note also the extended footing for the engine. Source: SRAO ELW 16.



Plan A6: The roofs are shown here in great detail including the lantern structure and end and side elevations. Also shown are the truss and the strut detail, and detailed sections and elevations of cast iron gutters and various wall boxes into which the gutters discharge. Source: SRAO ELW 21.



Plan A7: Details of the walls are shown including elevations and sections, coping stones and cornice, cast iron downpipes in the wall and details of the large iron, riveted sliding doors to the traverser bays. These no longer exist. Source: SRAO ELW 17.



Plan A8: The drawing of windows, doors and gutters indicate the high level of detail to which the building was deliberately designed. Note also the detailed designs for catches, bolts and hinges. Also shown is a detail for fillets for glazing purlins (re the roof glazing) and details of east iron gutters. The drawing is signed by Cowdery in October 1885. Source: SRAO ELW 22.

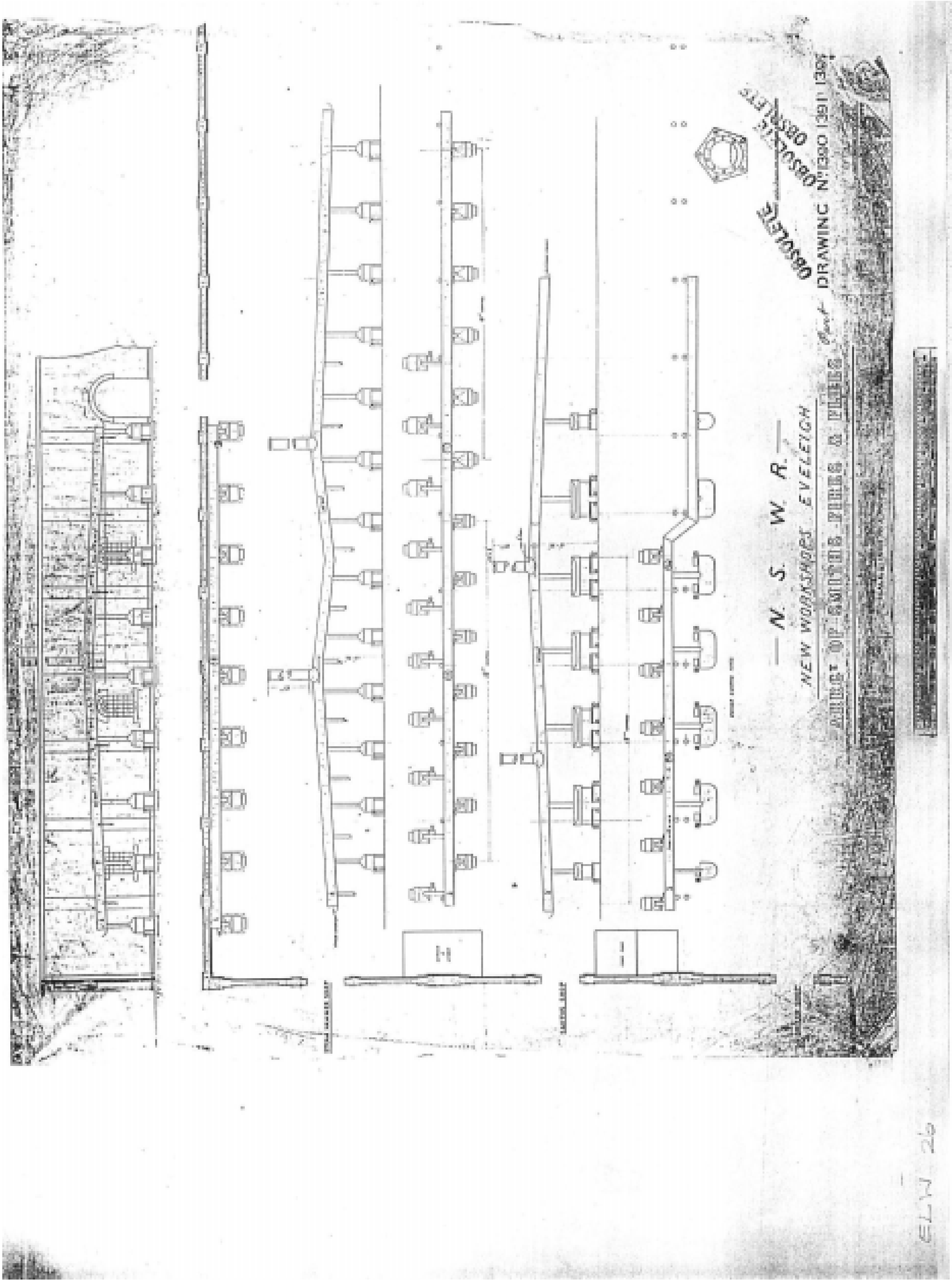
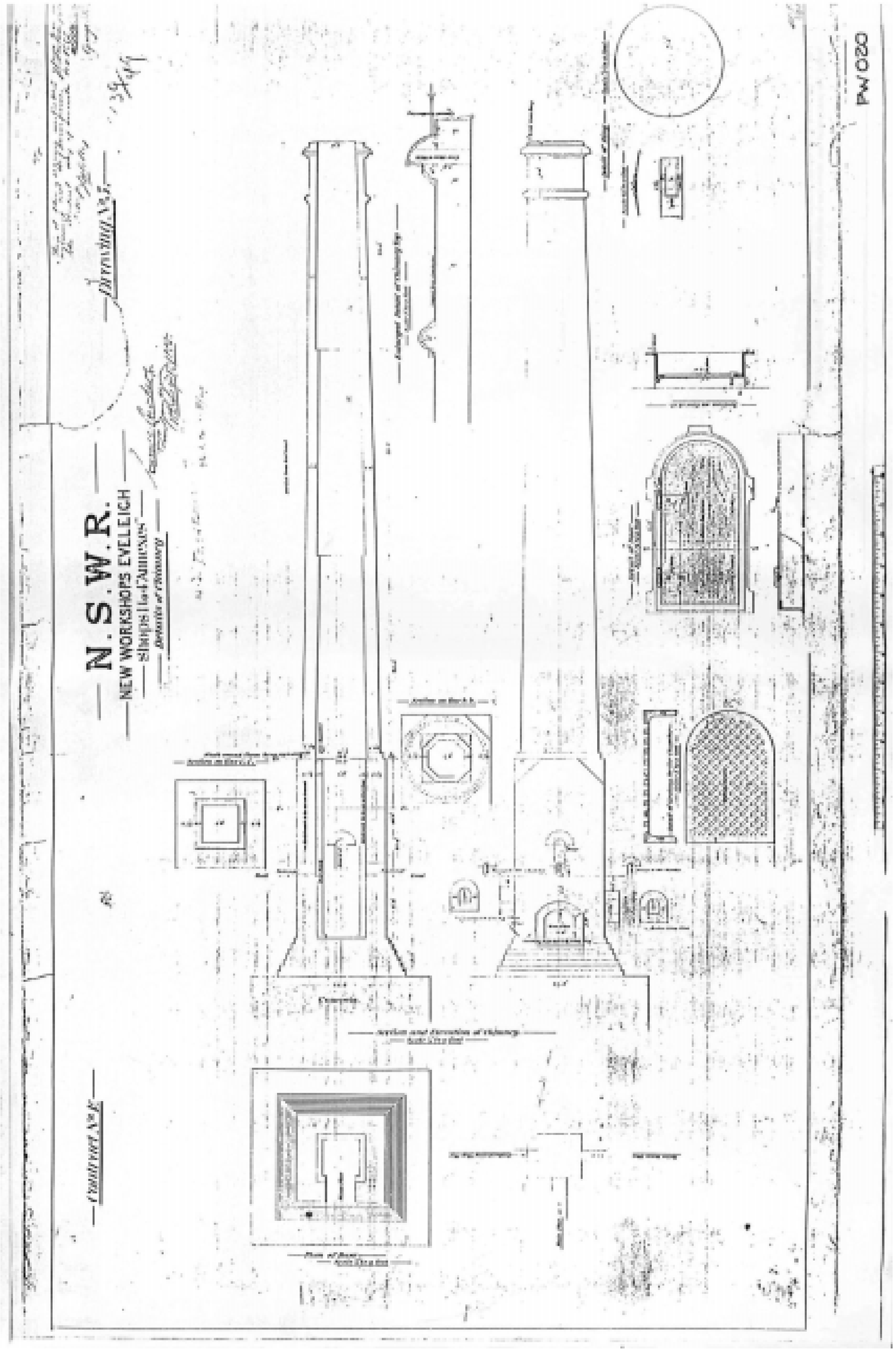


Fig: A9: The 1887 drawing showing the Smiths Fires and Flues is stamped obsolete, presumably at some later date. Photographic evidence confirms that flues and fires were installed according to this layout. Note that elevation of each installation are shown in the plan of the bay above. Source: SRAO ELW 26.



Plan A10: The footing of this chimney probably remains at the southern end of Bay 2 adjacent to Annex 2 where the fuel tank is now located. The underground flues, shown here in cross section, probably also still exist. Source: SRAO ELW.

APPENDIX E

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