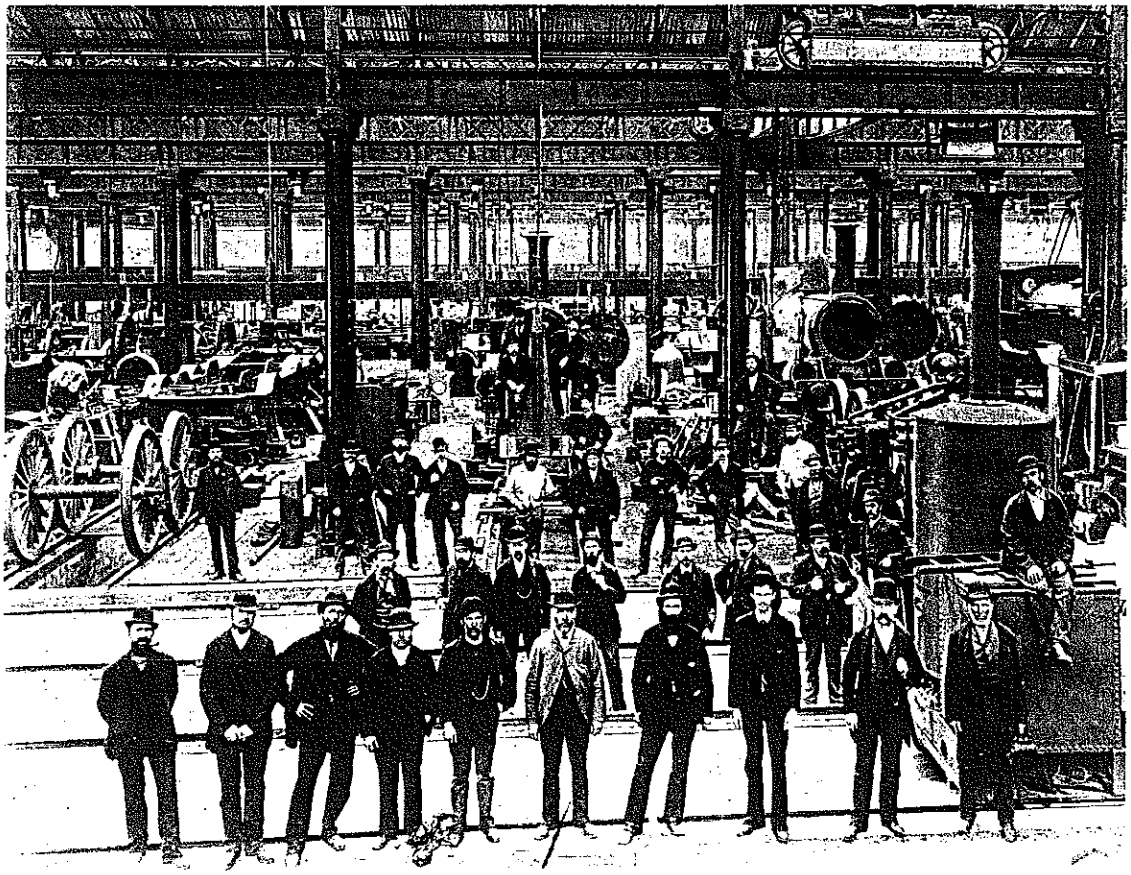
EVELEIGH RAILWAY YARDS
LOCOMOTIVE WORKSHOPS
CONSERVATION MANAGEMENT PLAN



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2. INTRODUCTION

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1. EXECUTIVE SUMMARY

The Eveleigh Locomotive Workshops, 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.

The place is of outstanding heritage significance for its historic, aesthetic, social and scientific values at local, state, national and in some respects international levels. The outstanding value of the place is dependent on the value of the place as a whole and in particular on 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.

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. Such conservation should be achieved through minimal intervention. To ensure the conservation of the ELW it is vital that a compatible new use be established and the place adapted as necessary. In the long term *maintenance* is the single most important conservation process minimising adaptation required for new uses. Bays 1 - 4 of the building should be *conserved* in total. The remainder of the building is robust and eminently suited to adaptive re-use within the conserved building envelope.

The policies are developed in detail for maintenance, future use, new work, management, interpretation, etc. and urgent action is recommended. Treatment of fabric, spaces and qualities are recommended for each level of significance. In each policy area there is a major policy which is followed by sub-policies.

The constraints and opportunities are analysed, providing 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. These will require cooperation and commitment of all the stakeholders, but will ensure the place is conserved. It is recommended that Bays 1-4 (or 4a) be conserved, if possible, as an operating workshop. This conflicts to an extent with the proposed 'museum' use. These constraints however may lead to a creative and innovative approach to the design to resolve the conflict.

Initial works to the building must ensure that a minimum level of work is done over the whole building, especially on stormwater collection and disposal. Fabric conservation works can then proceed from east to west or as required for re-use. Preservation is recommended for the machinery in the short term. Individual brief conservation plans are to be prepared for each group of machinery prior to recommissioning.

The building fabric inventory is designed to provide direct detailed guidance for documentation and incorporates significance and conservation policies. It has been completed only for the east wall where works are proposed in the short term. Pro formas are provided for the future completion of the inventory.

The report concludes with an examination of possible future uses and techniques for adaptation including examples which could provide models for conservation and development of the Eveleigh Railway Workshops.

2. INTRODUCTION

2.1 AIMS OF THE REPORT

This Conservation Management Plan has been commissioned by the Department of Public Works on behalf of the City West Development Corporation. It has been prepared by the Heritage Group of State Projects in March and April 1995.

The Conservation Plan aims to be a practical guiding document when considering or documenting future works, including maintenance, for the Eveleigh Locomotive Workshop and to be submitted with Development Applications. It will comprise one of the bases for future planning and provide a base against which to assess the heritage impact of proposed developments.

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

> *The aim of conservation is to retain or recover the cultural significance of a place and must include provision for its security, its maintenance and its future.*

The aim of this Conservation Management Plan, therefore, is to produce a document that sets 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..
- Strategies for implementing these policies.

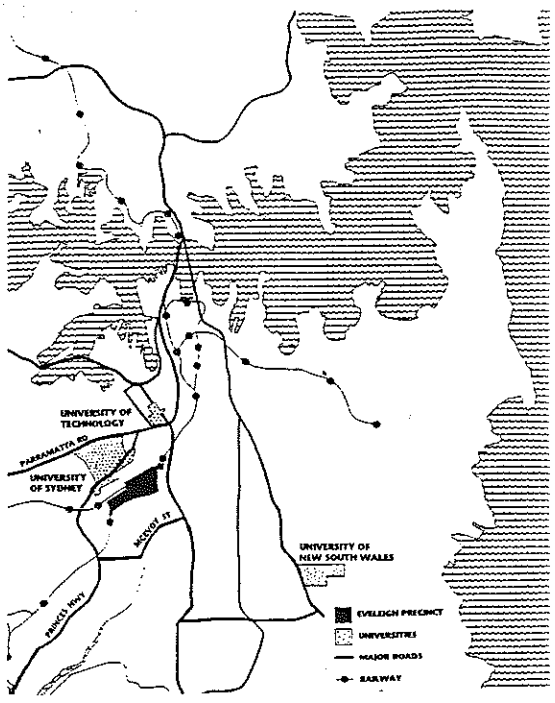
The report establishs a methodology for surveying and assessing the building and the machinery. It is intended that this can continue to be added to as detailed information is required but will be initially useful by concentrating on areas where detail is currently required.

2.2 SITE AND OWNERSHIP

Location and Physical Context

The Eveleigh Railyards are located in the inner city immediately to the south of Sydney's CBD and Central Station. The yards are sited on either side of the main southern and western rail lines and between Redfern, Erskineville and Macdonaldtown Stations and hetween 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.

The subject of this report is the Eveliegh Locomotive Workshops (ELW) building which is located within the Eveleigh Railyards 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.



Plan 1. 1: Site plan.

This area has been extensively cleared since 1988 and below it, along its southern boundary is the tunnel for the Eastern Suburbs Railway. Immediately to the east is an open area and to the east of this is the New Engine Shop and to the north-east the former Works Manager's Office. To the west is 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) and already subject to a Development Application, 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 has been in continuous use as a railway workshop until its closure in 1988 and in continuous State Government ownership since its construction in 1887. Its ownership has recently been transferred to the City West Development Corporation from SRA who will still retain other portions of the Eveleigh yards in their ownership.

The Locomotive Workshops are now largely vacant. The surrounding Eveleigh Precinct includes an area which will be managed by the Department of Housing for a new housing development. Portions of the site are to be leased immediately on a 99 year basis to Australian Technology Park Sydney Limited. The Locomotive Workshops are currently used by Wrought Artworks, an SRA Electrical Branch, Public Works (CWDC's project manager), and other temporary uses is proposed in the short term. This report is to provide guidelines for proposed new works to the building. In the short term this comprises emergency repairs and upgrading of the east wall which is proposed to take place in the current year.

2.3 SCOPE OF THE REPORT

This report sets out the cultural significance of the Locomotive Workshops developed by analysing the building 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 guidelines for implementing the policies developed.

Comments - The Conservation Plan needs to be acceptable to, and endorsed by, all those involved with the management of the site and to this end a preliminary draft has been circulated for discussion and incorporation of comments. Comments were obtained from; Heritage Branch and City West Office of the Department of Planning, Tom Forgan Director ATPSL, Jim Pfeiffer for the City West Development Corporation, NSW Public Works, the SRA Heritage Committee and the ELW Steering Committee.

Inventory - The detailed physical analysis of the building has been carried out in the form of an inventory, completed in detail for the east wall and for other areas. It is beyond the scope of this report to complete an inventory of the place and all machinery and services. It is recommended that this be done progressively as the need arises.

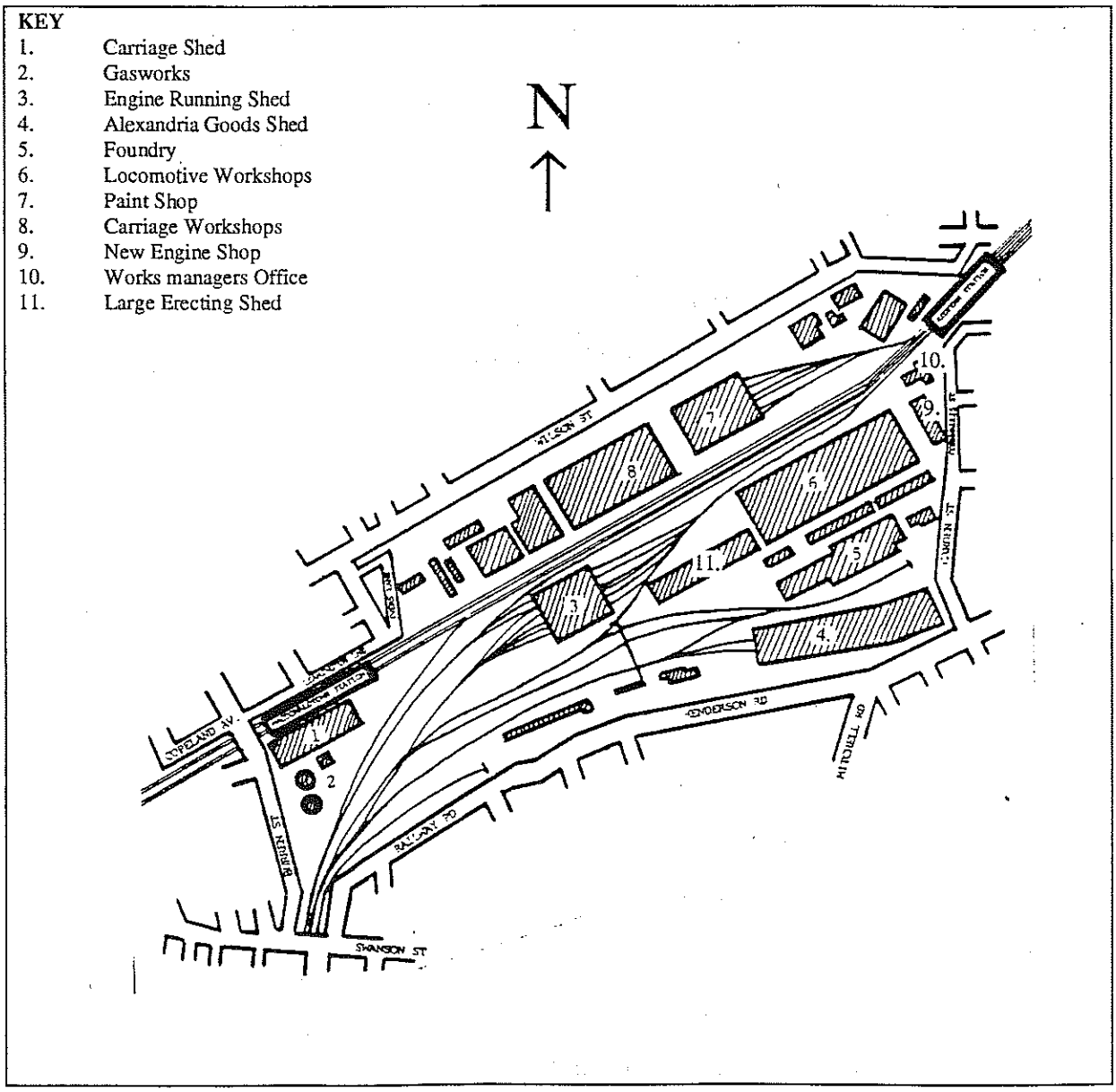
Research - Limited historical research has been carried out for this report due to the constraint of time. Research has been carried out to find crucial plans or photographs, for example, early photos of the east wall, and to ascertain basic information about the building's designer. An operational history is included as this is crucial in understanding the significance of the place but no new research has been undertaken on social value and little has been done previously on this important aspect of the history

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) Sydney 1991 and is consistent with the guidelines as set out in "The Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (the Burra Charter)", 1988.

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 which accompanies this report, provides a model for further surveying of the place. It aims to provide the information necessary when considering works to each item.



Plan 1. 2: Site plan of the Eveleigh Railway Yards, c1950.

2.5 TERMINOLOGY AND ABBREVIATIONS

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").

Fabric *means all the physical material of the place.*

Conservation *means all the processes of looking after a place so as to retain its cultural significance. It includes maintenance and may according to circumstance include preservation, restoration and adaptation and will be commonly a combination of more than one of these.*

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

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

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*

Reconstruction *means returning a place as nearly as possible to a known earlier state and is distinguished by the introduction of materials (new or old) into the fabric. This is not to be confused with either re-creation or conjectural reconstruction which are outside the scope of the charter.*

Adaptation *means modifying a place to suit proposed compatible uses.*

AO	NSW State Archives
ATPSL	Australian Technology Park Sydney Limited
BC	Better Cities Program
CWDC	City West Development Corporation
DOP	Department of Planning
ELW	Eveleigh Locomotive Workshops
EP	Eveleigh Precinct
H & CB	Heritage & Conservation Branch of DOP
ICOMOS	International Council on Monuments and Sites
LEP	Local Environment Plan
MP	Master Plan
ML	Mitchell Library
PW	Public Works
REP	Regional Environment Plan
SRA	State Rail Authority
SRAO	State Rail Archives Office
SSHS	South Sydney Heritage Study
UDP	Urban Development Plan

Note - During the course of this report the names of some government departments were changed, following restructuring, as follows:
DOP became DUAP - Department of Urban Affairs & Planning
PW became PW & S - Department of Public Works and Services.

2.6 CONTRIBUTORS AND ACKNOWLEDGMENTS

Project team
This report was prepared by the Heritage Group, State Projects Division of NSW Public Works. The project team consisted of:

Jean Rice	conservation architect
Joy Singh	conservation architect
Jim Loke	structural engineer
Don Godden	consultant industrial archaeologist
Tony Brassil	consultant industrial archaeologist, carried out research on the operational history
Otto Cserhalmi	consultant conservation architect carried out the building fabric survey.

Assistance
Assistance was provided by:

Mr Jim Pfeiffer	CWDC
Tom Forgan	ATPSL
Andrew Hanna	PW (ATP)
Greg Spence	PW (ATP)
Bruce Everett	PW (ATP)

C. & M. Doring commented on comparative value. Dale MacBean provided the 1985 structural report prepared by Colin Crisp, Victor Poljanski of SRA Archives accessed photos and plans and further assistance was provided by staff of the SRA Plan Room, SRA Planning Department and by the staff of the Mitchell Library.

David Sheedy provided information and critical comment. Guido Gouverneur provided information and access to the operating sections of bays 1-4.

Commentary
Alan Bright commented on behalf of the Department of Planning, City West, and Mary Knaggs and cath Snelgrove for the Heritage Branch.

2.7 CONSTRAINTS AND LIMITATIONS

The primary constraint on this report was time and funds which limited the ability to do original research and to complete a detailed fabric analysis. Some reports were not readily available and the large number of reports on the site prohibited a thorough assessment of their relationship to heritage issues within the time available.

The building was the subject of a Public Works "Safety Alert" Primarily because of electrical safety. General access to the roof and parapet and to the high level structures internally was not available. Limited inspections were made of one area of roof and one column/truss/gutter/girder junction. A more detailed inspection is needed.

2.8 FURTHER RESEARCH

There is potential for further research into the social and technological history at Eveleigh. Some will be carried out during forth coming studies on the social history of the Eveleigh yards and on the moveable items and relics. An historian should be employed to establish the historical context with input from an industrial archaeologist. Areas of further research include:.

- A search of Railway Archives and 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.
- Information held in the railway offices on the Carriage Works site, offices at Sydenham and elsewhere.
- Research into the technological history and research into social history. This should involve extensive consultation with former workers and managers and with long term local residents. Such consultation, of necessity, should be conducted over an extended period.
- 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 comparable buildings of the time overseas.
- The site history, operational history and sequence of development of the Eveleigh Railway Yards as a whole to provide an adequate basis for site interpretation.
- The operation and history of each machine. In particular when work is comtemplated to that machine or interpretation is being developed.
- Research with former workers who operated machines to provide operational information and stories associated with machines.
- Railway archives holds 16mm film taken at Eveleigh in the 1940's which may reveal historical information and may be invaluable for interpretation.
- Recent videos of the site have not been considered. One by Julia Gretten is a historical documentary which could be used for site interpretation.

This plan, in particular the statement of significance and conservation policy should be reviewed in the light of any further research.

Currently two further reports on the Eveleigh Railway Yards are about to be undertaken as follows:

1. Management Plan for Moveable Heritage Items/Relics at the Locomotive Workshops, Eveleigh. This plan is being funded by CWDC, SRA & DUAP.
2. A Social History of Eveleigh Railway Workshops. This history is being funded by the CWDC & SRA.

The Community and Heritage Retention Unit of the Property Services Group is acting as project directors for the carrying out of these reports. Many of the areas noted above will be covered by these reports.

3. HISTORICAL ANALYSIS

3. HISTORICAL ANALYSIS

3.1 BASIS AND SOURCES OF BRIEF HISTORY

This section reviews existing research and the historical analysis that follows is based largely on published sources. The contextual history explains the place of Eveleigh in the local area and in the rail network. A comparison is made with other railway workshops, Australia and world wide, based on existing information, to establish the importance of the place at national and international levels. More work is needed on international comparison but in practice this will not affect present recommended approaches to the place. Section 3.4 is a more specific history of the Eveleigh yards as a whole and refers to the Heritage Study by Godden & Mackay. Additional information relates to operational history.

Historical information in the Heritage Study was primarily from railway Archives. A great deal of historical material was lost when the yards closed, including records of machines, patterns, etc.

The workshop itself is then considered referring to Godden & Mackay. The section on the designer is largely drawn from Cowdery's manuscript 'Life Sketch', held in the Mitchell Library. The history of the machinery has been written by Don Godden based on knowledge of the site built up over many years of involvement.

3.2 REVIEW OF EXISTING RESEARCH

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

1.A Heritage Study of the Eveleigh Railway Workshops Vol 1. Godden, Mackay and Associates, 1986

This report was written in 1986 when the workshops were still in operation. The bulk of the report identifies machinery and buildings which 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. This is the most thorough history of the site written to date but did not include research into all known sources. The report includes a statement of significance for the whole site which 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.

2. Conservation Policy Schwager Brooks, 1994.

This report was based on information contained in the heritage study and did not involve historical research nor 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 and the policies should be reviewed in the light of change of ownership and the lease of sections of the site and the policies amended if necessary & adopted by new owners and lessees.

Other Reports

A large range of reports have 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, eg the extensive reports done by post-graduate students at UTS and the University of Sydney.

3. Relics Policy — 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.

4. South Sydney Heritage Study — Tropman & Tropman, 1995

Not yet completed. Includes development of surrounding area but specifically excludes Eveleigh.

5. Master Plan And Urban Development Plan — Keys Young & CWDC, 1994

See later.

6. Urban Development Plan — McConnel, Smith and Johnston & DOP, 1993

See later.

7. Ground Contamination — Johnstone

Indicates the nature of contamination in some areas of Locomotive Workshops.

8. Geotechnical Investigation — Gutteridge Haskins & Davey

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.

9. Structural Report — McBean and Crisp. 1985

Identifies the same structural concerns and overall condition as evident in 1995.

10. Condition Assessment — Rice Daubney, 1994

Identifies extensive problems and recommends extensive works. No analysis in relation to significance.

11. Electrical Services Assessment — Ove Arup, 1994

Identifies hazardous areas and recommends disconnection of services.

12. Investigation of Drains — A & A, 1994

Includes video inspection of stormwater lines and recommends replacement

13. Eveleigh Precinct Planning Study — Lester Firth & Ass., 1992

14. Eveleigh Precinct Social Impact Study — Brian Elton & Ass., 1994

15. Area Strategy - Eveleigh — Building Better Cities Program, 1992

16. A Report on the Preservation of Eveleigh Workshops, Redfern — R.K Butcher, 1991

17. Eveleigh Railway Workshops, A National Transport Museum of Australia.	G Saunders, University of Sydney Thesis, 1991

As the list above indicates, there are studies of particular elements, for example machinery and buildings, but there is no Conservation Plan for the whole site. Consequently there is no analysis of the history, development and operation of the site and no Statement of Significance, on which to base decisions and policies for the future development of the site. A conservation plan would provide an understanding of how 'items' relate to each other and of the overall significance of the site.

3.3 THE WIDER CONTEXT

Development of Sydney's Rail System

The first railway in the world which operated with steam locomotives on iron rails was the Stockton and Darlington Railway in England which opened in England in 1825.

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.

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.

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. 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. Soon after the Parramatta line was duplicated and a line to Liverpool was completed a year later.

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.

Development of Sydney's Railway Yards

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. By 1865 a timber extension had been constructed, over a section of track to allow the locomotives to be worked on under cover. 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, See Illustration 1), all connected by rail to a circular turntable. The complex also included a carriage shed, goods shed (located adjacent to the temporary shed) and a meat storage shed.

Illustration 1.1: Redfern Terminal Engine Sheds, Early 1870s. The design of these sheds is typical for the type and they are similar to English models, Burke, p.6.

A panorama of Redfern Railway yard drawn in 1870 (Illustration 2) shows how the complex had expanded. 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 is more than two bays wide. The form of workshop buildings is similar to that employed in England, however stone was more widely used as a building material in Sydney.

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

A separate railway line was constructed, which opened in 1857, to link Maitland and Newcastle. This line was extended allowing for the export of coal. Workshops were erected at Honeysuckle, Newcastle, to serve this line. A similar gable ended form to the Redfern yard, which generally enclosed two lines, was constructed. A separate workshop was established at Newcastle as prior to the construction of the Great Northern Railway there was no rail link between the Sydney network and the Newcastle line.

In 1860 Whitton submitted plans for a new phase in Railway construction. By 1873 the country lines from Sydney extended west to Raglan (nr Bathurst), with a short north west branch to Richmond and to south west to Goulburn. An Act enabling the construction of a Northern Railway was passed in 1881 and the line was opened in 1889.

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). The detailed design at Eveleigh was done by George Cowdery, Engineer for Existing Lines.

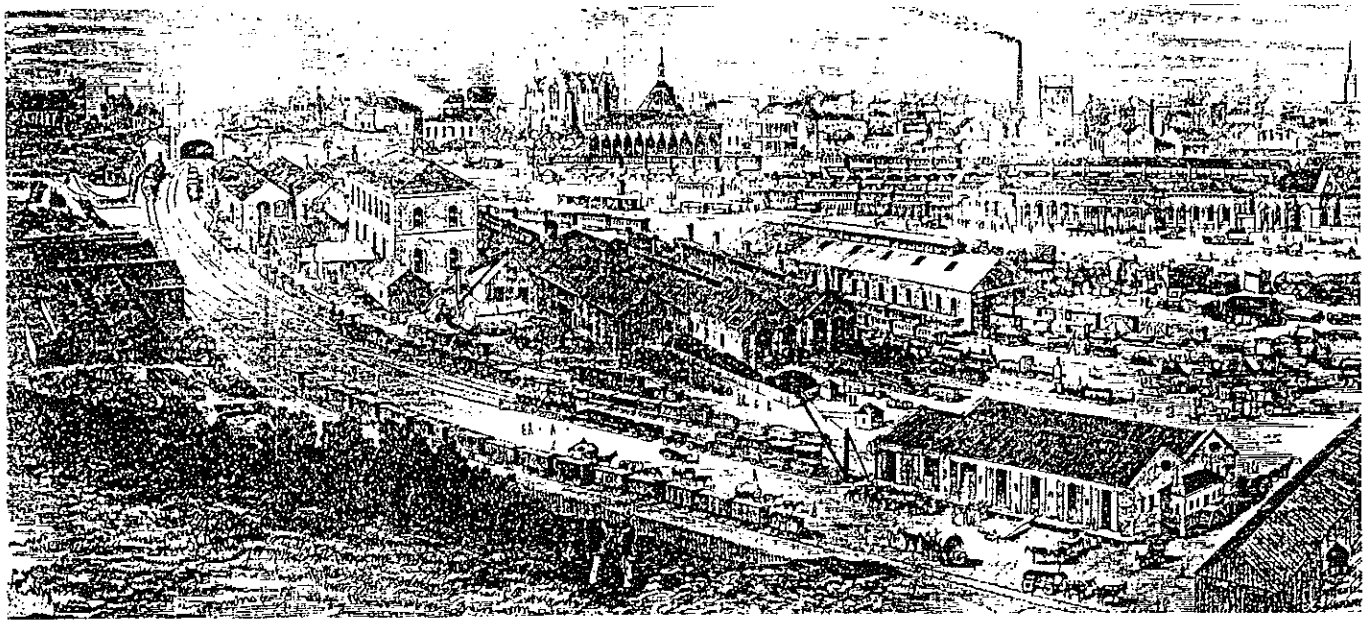


Illustration 2: Panorama of the Redfern Railway Yards, 1870.

Victorian Industrial Buildings

Initially industrial buildings were constructed of load bearing brickwork. With the coming of the iron age and the need for free floor space, cast iron pillars began to be used for internal supports from the beginning of the nineteenth century. 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 arose in railway departments. Bannister Fletcher attributes the technical advances in the use of iron to the early engineers and mentions amongst others Robert Stephenson and Brunel (both of whom were known to Whitton and Cowdery). Cast iron was combined with wrought iron to accommodate tension stresses. The great era for iron construction was the mid- Victorian period, 1840's, and culminated in structures such as the Crystal Palace (1851-2) with its ridge and furrow glazing and Paddington Station sheds (1852-4) by Brunel and Wyatt.

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. Double columns were used to support crane rails with single columns above to support the roof. Iron columns increased floor space while iron trusses allowed wide bays and these bays were combined side by side. Top lighting was used to admit light to the large workshops thus created. This format was common in railway workshops but also in a range of other workshops, for example for the manufacture of ships and large engines. (Monuments of Industry). Later developments of the idiom (1900-1910 in Australia) saw the use of riveted steel plate members replacing cast iron eventually to be supplanted, for smaller members at least, by rolled steel sections. This was also about the time of conversion from steam to electric power.

Conventional stylistic features were used in nineteenth century engineering structures and their development is in parallel with 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 19th century taste and thus often retained masonry external walls.

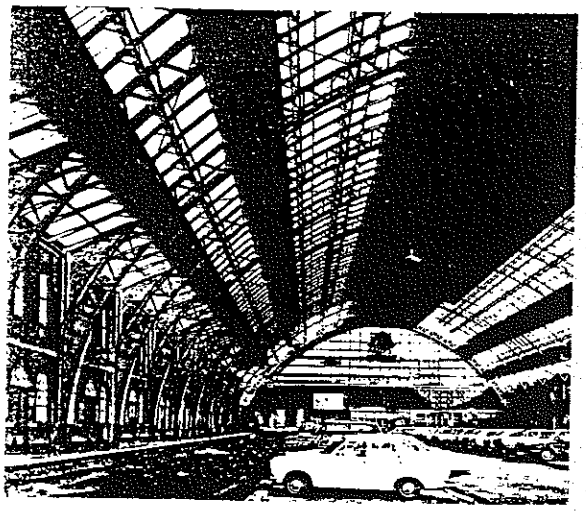


Illustration 1.3: Manchester Central, England 1876. Train Shed designed by Sir John Fowler. This type was represented in Australia by the now demolished Eveleigh Running Sheds, Binney & Pearce, p.46.

World Development of Railway Buildings

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,.

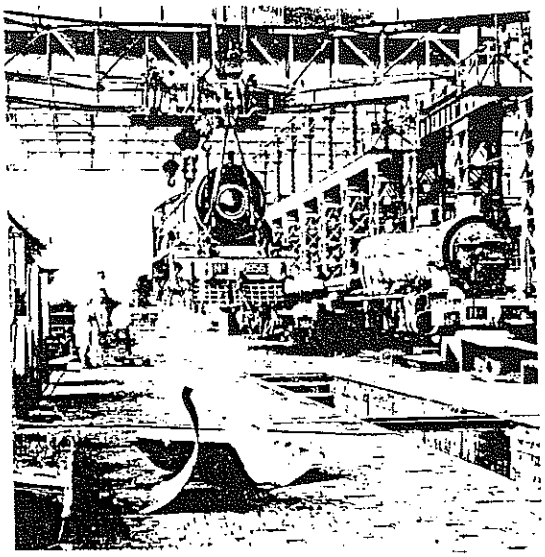


Illustration 1.4: The Erecting Shop of the Locomotive Works at Mogghulupura, Pakistan . Thought similar in functional layout and structural system to Eveleigh, this building is from a later genre with riveted "lattice" columns, Nock, p.78.

Railway "sheds", over stations, developed differently to railway workshops. Railway sheds needed large spans, also leading to the use of iron, but as there was no need for cranes loads, spans could be greater and designs were not constrained by the need for bays. The English models essentially generated by needs and contemporary technology were repeated and developed throughout England and in other countries. In "Railway Architecture" it is 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". They refer specifically to sheds where engines were maintained but also generally to whole railway workshop complexes.

The earliest sheds were roundhouses with a turntable in the centre but these quickly became redundant and straight sheds became more common. The design of sheds was often the responsibility of the chief mechanical engineer and various private companies developed their own standardised design which was then repeated. Well known large sheds included Swindon, Derby, Crewe, Rugby (with 25 tracks), Glasgow, Highbridge, Stafford, York - well known either because of their size or because they have survived.

Throughout the late 19th and early 20th century steam railways developed throughout the world. No definitive worldwide study has been done and the brief comments that follow are based on published sources and on the personal experiences of the authors of this report and others consulted. There are still operating steam railways in India, China and South America which must have had operating workshops. Little is known about these nor those in Eastern European countries and the former USSR which also must have had operating steam facilities. In a published example in Pakistan the erecting shop of a locomotive works at Moghulpura uses later forms of construction that is, riveted plate construction.

In the USA the Smithsonian Institute commented in 1986, when Eveleigh was still in operation, that there was nothing comparable in the USA. Equivalents were closed, most demolished, one remained as an empty building and one small workshop remained equipped.

In England personal experience and comments of experts at the Ironbridge Industrial Archaeology Institute indicate that most of the once extensive number of equivalent workshops have been demolished. Swindon was originally much larger but is mostly demolished, Ashford in Kent is closed and mostly demolished. Workshops at Crewe and Derby are still railway workshops 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.

Illustration 1..5: Engine Shed, Hasland, Midland Railway, England, Binney & Pearce, p.169. This is typical of Engine Sheds built in Australia for example, those shown in illustration 1.1.

The Ironbridge Museum is a working museum of traditional trades and a possible model for Eveleigh. England no longer has the heavy engineering capacity it formerly did demonstrated by the necessity to send large wheels to India to be turned.

Other Iron Buildings

Though iron was used in Greek and Roman buildings it was not in large scale use until the industrial revolution. The large scale structural use of iron was developed in the nineteenth century by engineers who developed a better understanding of the material and in whose structures the use of exposed iron was acceptable.

The development of the use of iron in architecture was confined to a few structural types. Firstly there were the greenhouses requiring large span, open buildings and developed in England and in Europe in the 1830' and 1840's. Then the railway buildings, where development paralleled the expansion of the railways. " The same engineers who built the iron locomotives and rolling stock designed also the roadbeds, the locomotive shelters, the repair shops and the passenger halls." (Steiner p39). This led to the transfer of the technology from engineering structures to buildings, particularly as these structures had no precedents.

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. Markets of various sorts also exploited iron structurally such as the early Covent Garden Fruit Market in 1826 and many late 19th century examples in France. Also in the late 1800's iron was applied to department stores as exemplified by the Bon Marche in Paris in the 1870's.

Illustration 1. 6: Glasgow Railway Workshops. The brickwork is similar to Eveleigh with semicircular arched openings. (Believed to be demolished), Binney & Pearce, p. 171.

Illustration 1.7: Glasgow Railway Workshops. The double columns, trussed roof, gantry crane, bays and top lit roof are very similar to Eveleigh. (The Glasgow Workshops are believed to be demolished), Binney & Pearce, 170.

In Australia, surviving examples of these types of buildings include a green house in Adelaide, railway workshops such as Eveleigh and railway sheds such as Sydney Terminal. The large exhibition buildings in Australia tended to be timber eg the Garden Palace, Sydney and the Melbourne Exhibition Building and iron examples are not known. Iron market buildings were built such as the now demolished Darling Harbour Meat Market and the George Street Markets (now site of the Queen Victoria Building), Sydney. 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, Sydney, was modelled on the Bon Marche, Paris, but used an innovative concrete structure. The South Dowling Tram Depot was a late 1908 cast iron columned structure by Cowdery Junior but this is now demolished. The Maclacy Museum at Sydney University utilises cast iron structurally and in box gutters within Gothic stone walls.

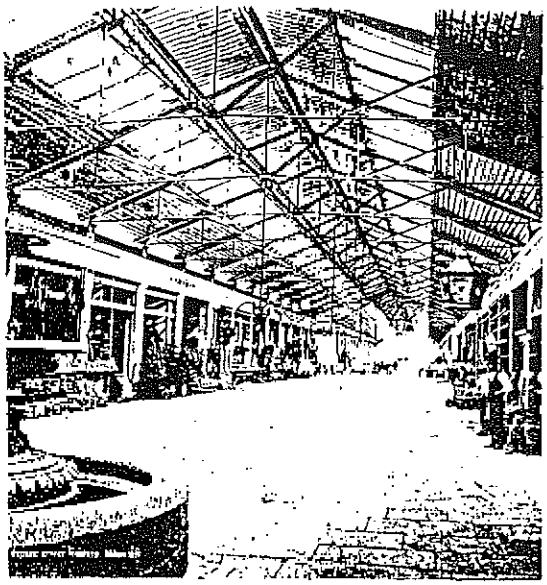


Illustration 1.8: George Street Markets, 1870, was an example of another type of iron building in Australia. It was replaced by the QVB, Sharkey Collection 776, PWD.

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. Subsequently cast and wrought iron were mostly used for decorative elements or balustrading, gates, ventilators etc.

Cast and wrought iron are different materials. Early use of iron in building was predominantly cast iron. The use of wrought iron in building developed when new processes were discovered for producing it economically. Cast iron contains about 3.0 - 5.0% carbon (and is more resistant to rust) and wrought iron contains 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, steel was not generally available until the 1890's and was not produced in Australia until 1915. Steel is 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 could be welded and was more economically made in a mass production process. (Elliot)

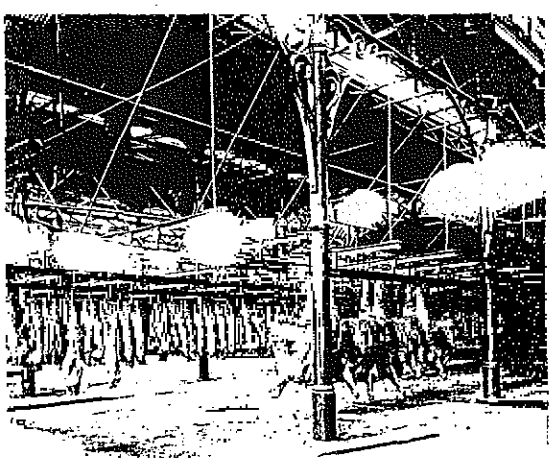


Illustration 1.9: Meat Markets, Darling Harbour. Interior view. The photograph shows round cast iron columns, wrought iron trusses and iron roofs. Sharkey Collection, PWD.

Australian Railway Workshops

Railways and their associated buildings developed in Sydney, Melbourne and Newcastle from the 1850's, in the mid 1850's in South Australia, in the mid 1860's 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 eg Newcastle and Sydney. The construction of large scale workshops coincided with the period of greatest expansion in the rail networks in the 1880's in NSW and Victoria but not until the first decade of the 1900's in Western Australia.

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. It is understood that neither is of the scale nor substantial character of the other major workshops.

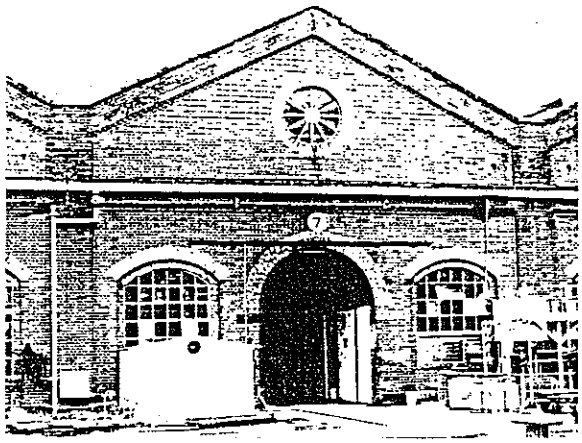


Illustration 1.10: Newport Railway Workshops, Melbourne. The composition of the building is less formal than Eveleigh. At Newport the gable is expressed as a pediment and the windows are semi-circular arches. Generally the buildings are similar with face brickwork divided into bays and forming a parapet, polychrome work around openings, the bulls eye window and the central opening, Doring, Newport.

Newport Workshops, Melbourne

The Newport workshops in Melbourne are comparable in nature and scale to Eveleigh and were built at the same time. They were designed by architects Breretin & Lewis and reputedly based on British Workshops. As an integrated complex and in their design they are superior to Eveleigh. The Locomotive and Carriage Workshops are in one complex on either side of central administrative and power facilities. A "road" ran across the centre of the complex linking all sections of the operations. At Eveleigh the main southern & western railways separated the Locomotive and Carriage Workshops.

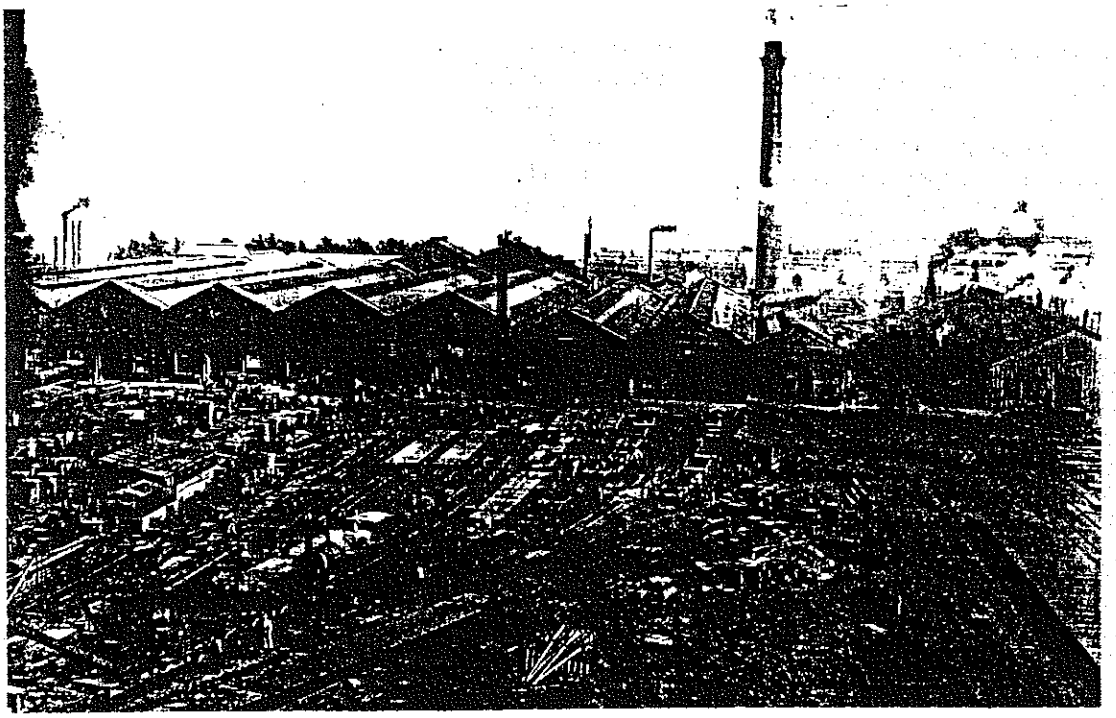


Illustration 1.11: Newport Railway Workshops , Melbourne. Historical view of half of the complex which is repeated to the left of this photo. Note the configuration of the building in bays and how the fan of rail lines serve each bay, Doring, Newport.

The Newport Workshops are similar in overall form to Eveleigh and in fact to the building "type" described previously. 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 semi-circular 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 round columns. 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 with the twin columns which are in fact being part of one casting. At Eveleigh the columns are round and are much more classically derived. The designers at Newport were probably trying for a more modern appearance. The trusses were not analysed in the Doring report on Newport but, from photos appear to be riveted angles with a flat bottom chord (ie at level of column tops) and span 45 or 47 feet. As at Eveleigh there were many later buildings but of lesser quality and value. 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, eg 1860 Kirkstall steam hammer and mechanical crane, exposed to the weather.

Midland Workshops, Perth

The Midland Workshops in Perth were initially constructed between 1904 and 1912, with continuing additions. They were in operation in 1993 when surveyed by C & 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 in common with Eveleigh and Newport but the character of the buildings is substantially different because of their later construction date.

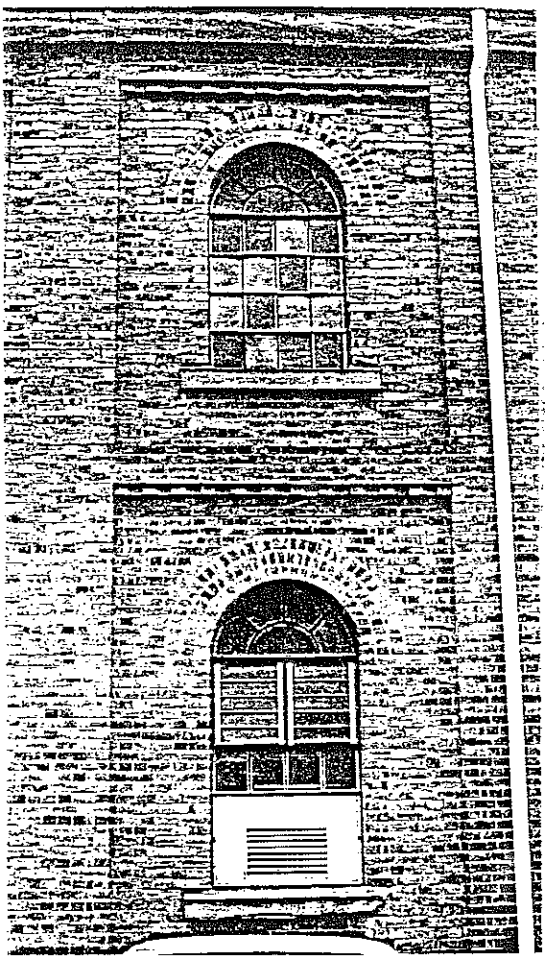


Illustration 1. 12: Honeysuckle Point. Detail of former Loco Boiler Shop, showing brickwork detailing, store sills and cast iron windows, Doring, Honeysuckle.

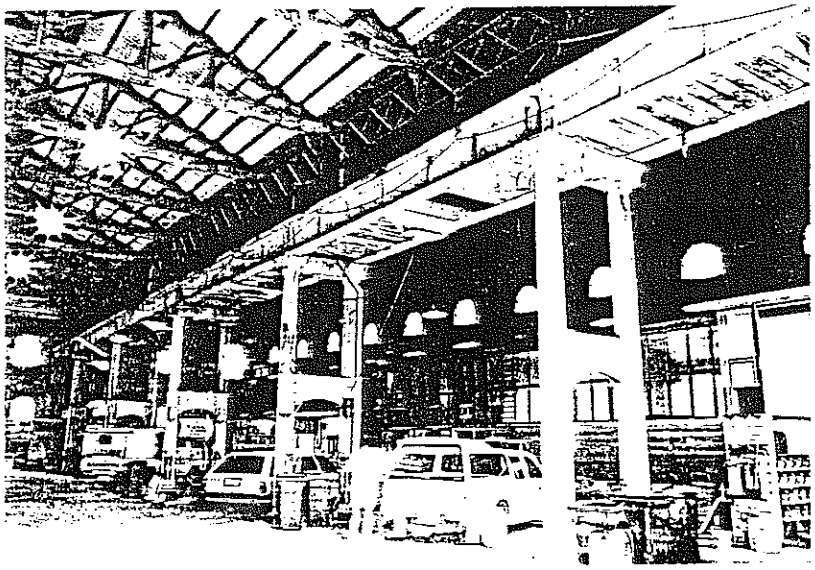


Illustration 1. 13: Honeysuckle Point Workshops, NSW, Interior view. Note the double columns and lattice girders, identical to Eveleigh. The roof trusses are timber, Doring, Honeysuckle.

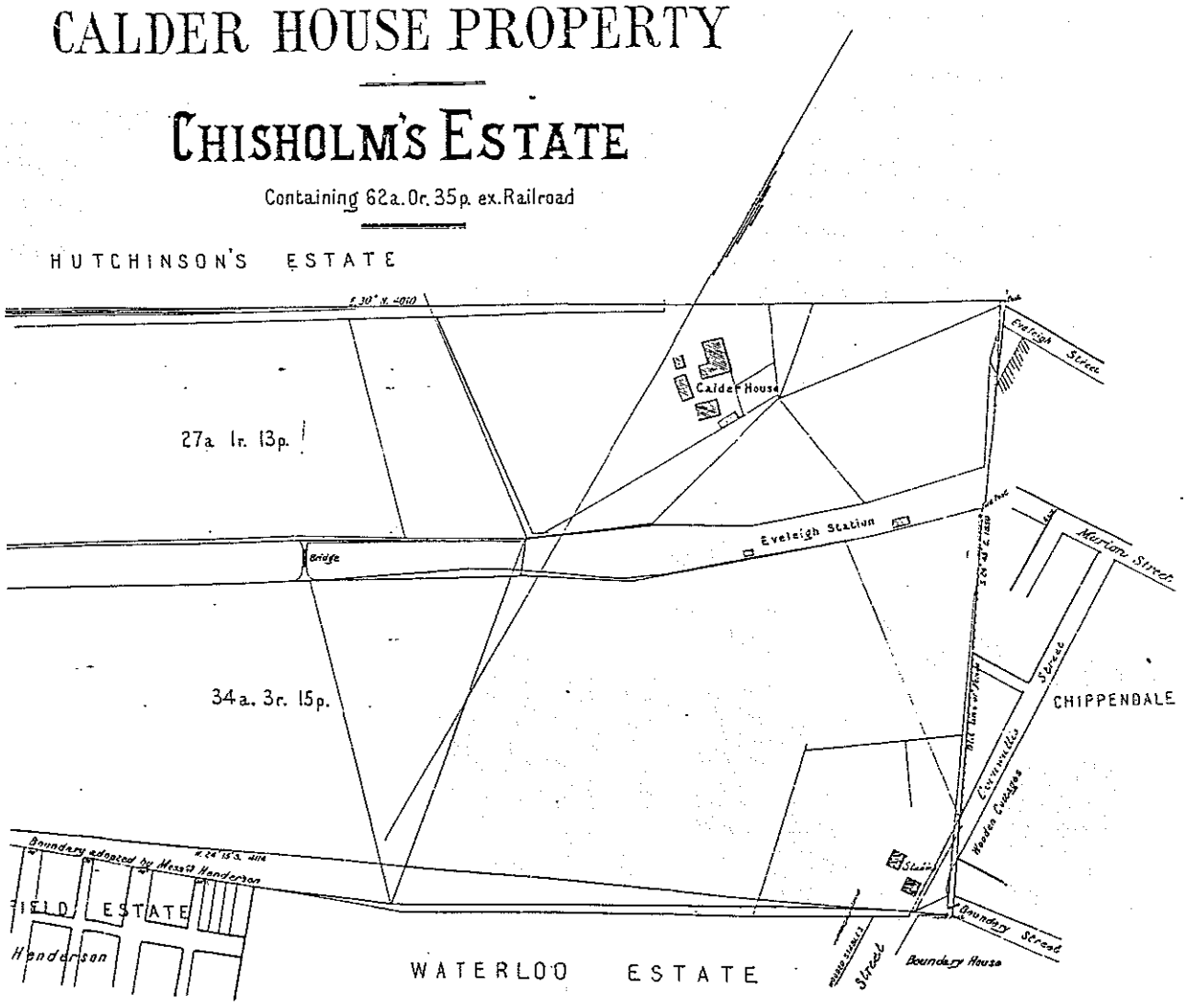
Though not as large as Eveleigh or Newport, Midland has a more comprehensive collection of workshops and their machinery and plant were all in working order in 1993. The functional layout is more sophisticated at Midland. The future of the workshops is uncertain and plans for complete demolition and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

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 was still threaded with the rope when surveyed in 1990 (therefore the only 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 much of the relics associated with the railways.

Launceston Railway Workshops

The Launceston Railway Workshops are closed and are subject to redevelopment. 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.



Plan 2. 1: Chisholm's Estate. This plan shows Chisholm's land when it was resumed for the Eveleigh Rail Yards including his house, the main rail line bisecting the property and also Eveleigh Station and a bridge. SRAO ELW1.

Local Context

The following information has been summarised primarily from research material compiled for the South Sydney Heritage Study by Tropman & Tropman with historical research carried out by Ken Cable and Rosemary Annabell.

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. Early land grants in the area were to Hutchinson, Chisolm, King, Chippendale and Shepard. Hutchinson also had very extensive holdings in Waterloo (1400 acres). There was little development on any of these sites until the late 1870's.

Hutchinson's grant, and part of Chippendale's grant bought by Hutchinson, was unoccupied until its subdivision into the Golden Grove Estate in about 1881. The subdivision of the site into small lots was intended to attract the "working man". The major building phase was between 1888 and 1893.

Chippendale sold his grant in 1821 to Levey who in turn sold part of it to Hutchinson. This area became Known as Hutchinson's paddock. It was on this site that one of Hutchinson's sons-in-law, John Rose Holden, built Eveleigh House. The house is believed to have been built in about 1840 and was named after Holden's mother's maiden name, Eveleigh (later written Eveleigh). The site was in the area of the present aboriginal housing cooperative. The site was subdivided gradually through the 1860's and 1870's.

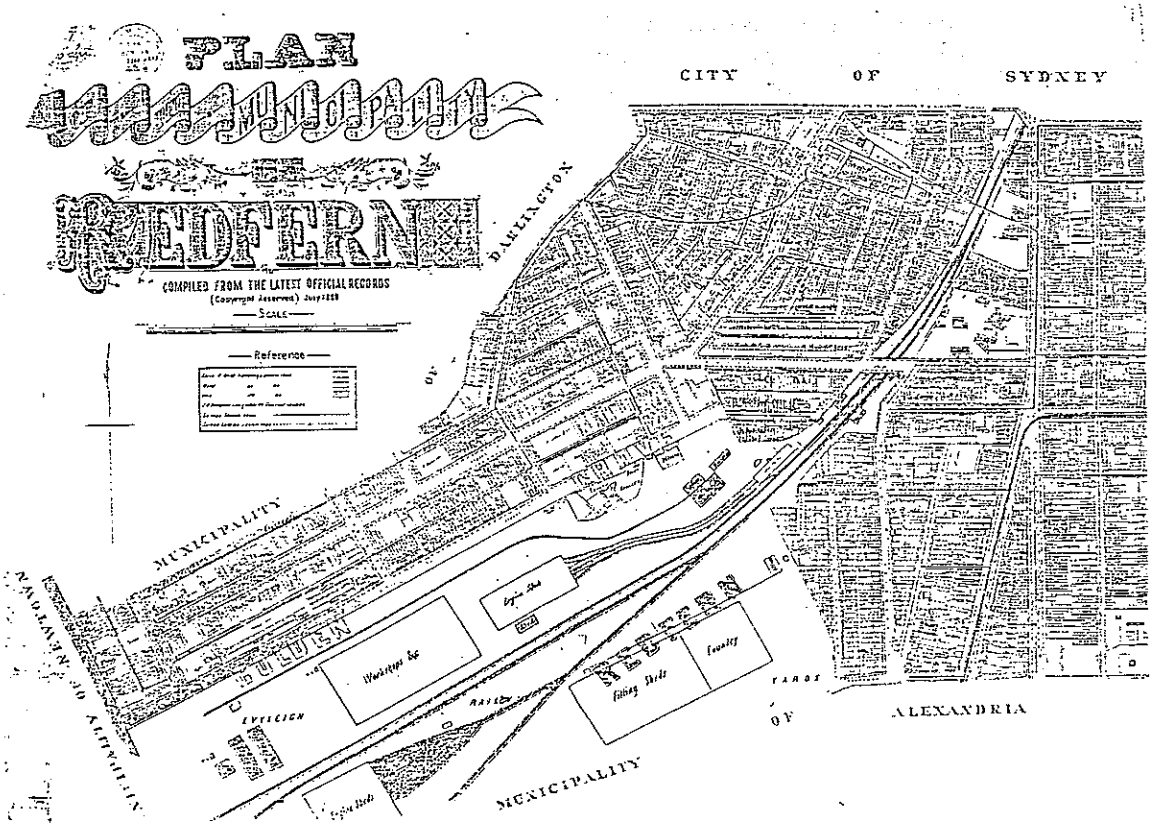
Chisolm built Calder house on his grant, probably in the 1820's. In 1855 the construction of the new railway cut Chisolm's grant in half and the house was effectively cut of from the remainder of the land. It was leased as a school - Dr Sly's Academy - until resumed by the railway's in 1878. The site (on Wilson Street) was used as a residence within the rail yards, until it burnt down in 1924.

The site for the Eveleigh railway yards (Chisolm's grant) was chosen in 1875, resumed in 1878 and the compensation price settled in 1880. Clearance began two years later and development continued into the 1890's. Eveleigh station (now Redfern) was opened in 1878 and was renamed in 1906. The former Redfern Station was renamed Sydney Terminal (Central).

King's grant 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.

The residential development of the area proceeded in the 1870's and 1880's 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 railyards 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 boundaries of the extent of the current Alexandria housing project. Further land (and houses) were resumed for the eastern suburbs railway in 1960.



Plan 2. 2: Plan of Redfern, 1889, showing the Eveleigh Rail Yards, ML M4 811.1819/1889/1.

3.4 THE EVELEIGH YARDS

See Godden Makays "Heritage Study" for a more detailed history of the Eveleigh Yards. The chronology which follows, notes key events in the development of the yards..

Plan 2.3 on page 23 is an 1887 diagram of the Workshops. It shows the original configuration and indicates broadly how the yards operated. The site is bisected by the main lines with the Paint Shop and Carriage Shops to the north and the Locomotive Shop and Engine Running Shed to the south.

The Engine Running Shed is now demolished but was the first building completed and was the building over which Cowdery was criticised for extravagance. It comprised three segmental arched bays each covering 7 "roads" without intervening columns

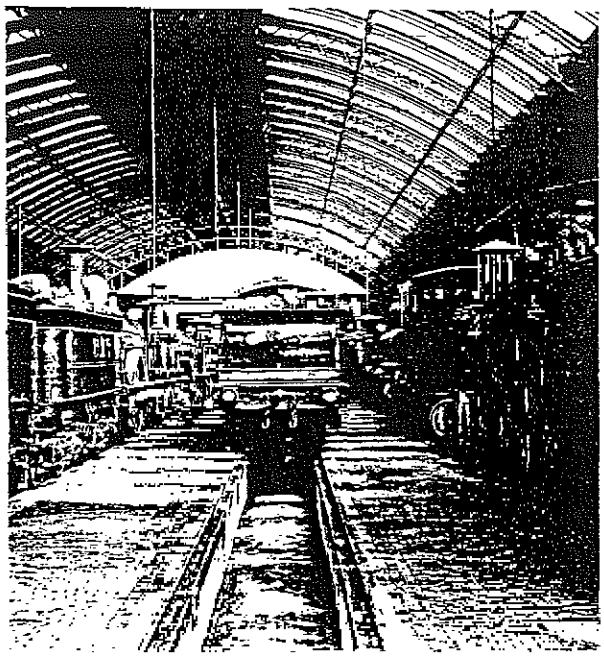


Illustration 1.15: Engine Running Shed, Eveleigh. The interior view shows the iron structure of the arched roof, Sharkey Collection 971, PWD.

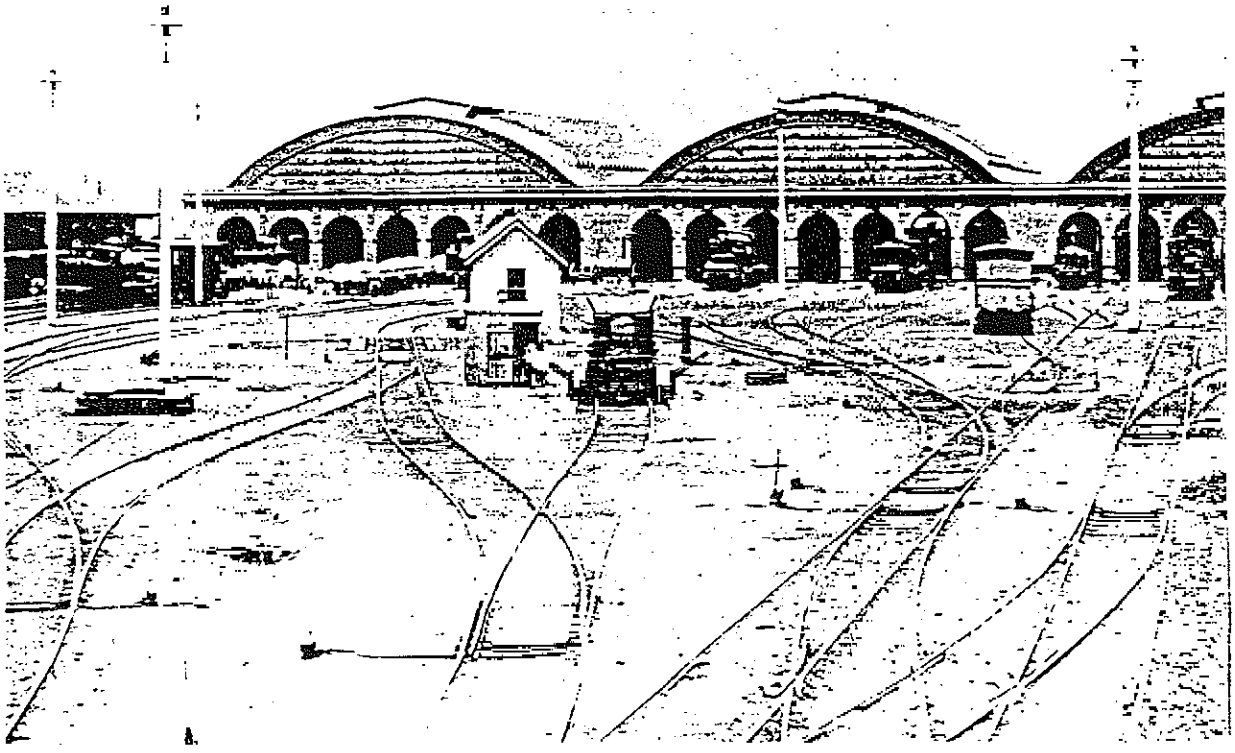


Illustration 1.14: Eveleigh Engine Running Sheds, 1887. Exterior view showing Cowdery's segmental arched roofs each covering seven "roads". The last bay was demolished in 1960, Burke, p143.

The original phase of the yards 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. Later developments are described in the "Heritage Study". The major changes were the demolition of the Running Shed (northmost 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). The yards continued to grow and expand throughout its life, and functions were 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 yards declined gradually in the late twentieth century as the work culture changed, until the closure in 1988. Today the functions formerly carried out at Eveleigh are no longer carried out by government enterprises or no longer carried out in Australia.

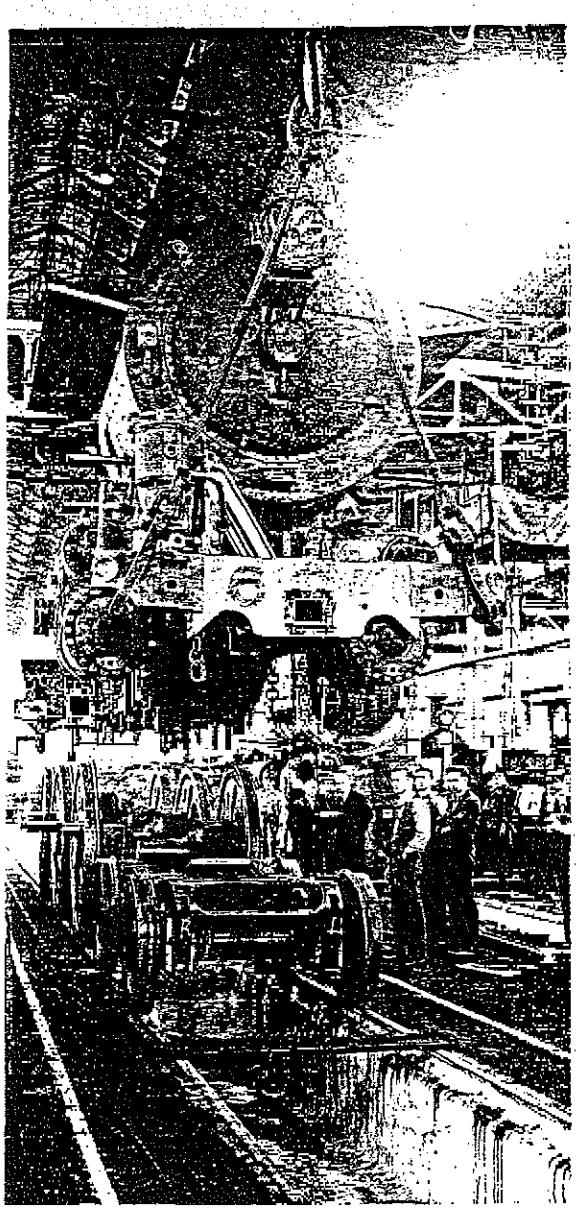
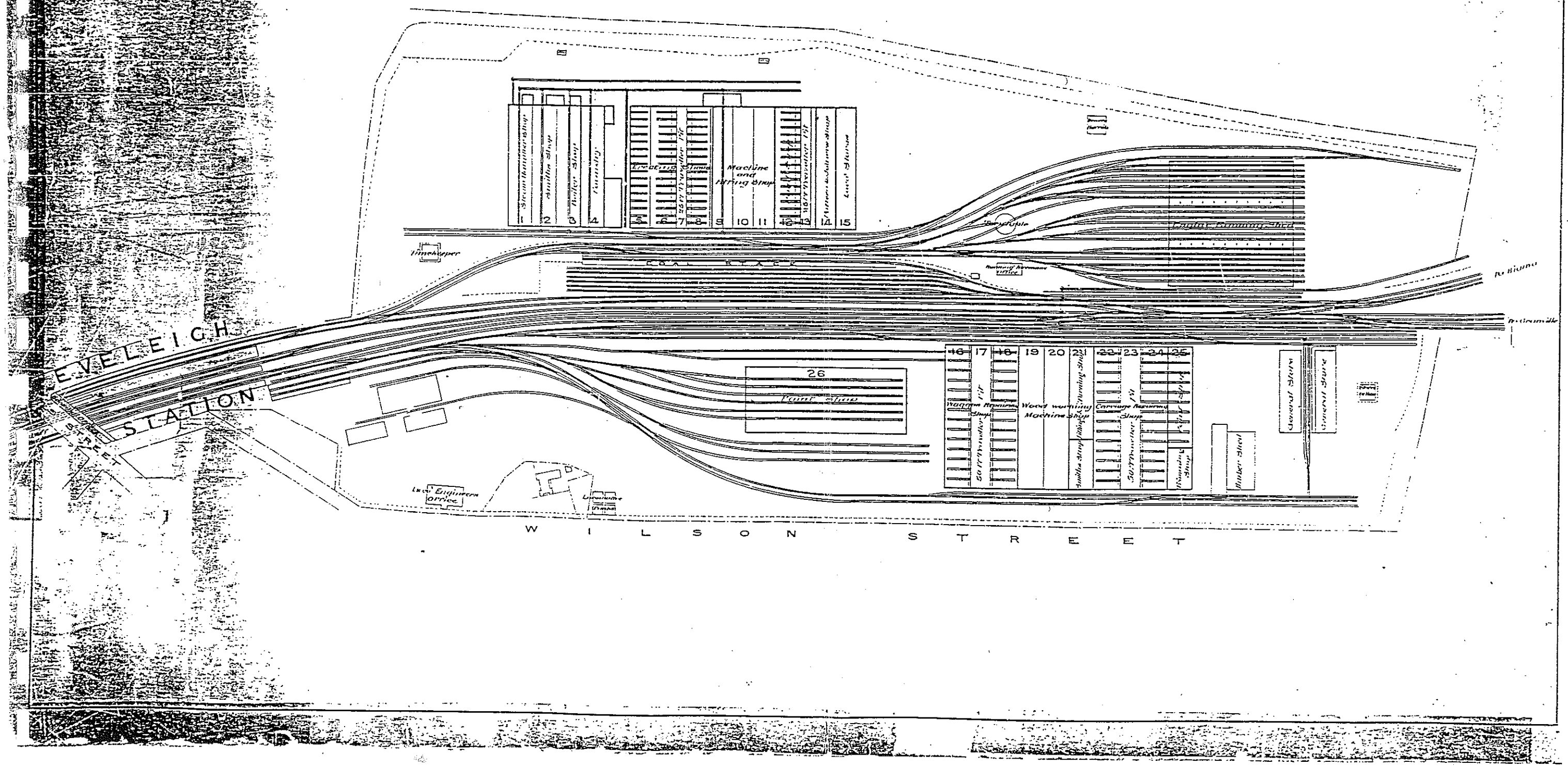


Illustration 1.16: A C38 being lowered to the wheels in the Erecting Shop at Eveleigh. This building remains in SRA ownership and use. Burke, p.191.

N.S.W.R.

DIAGRAM OF WORKSHOPS

EVELEIGH



Plan 2. 3 Diagrams of Workshops in 1887 showing original configuration. The Locomotive Workshops are Bays 1 - 15 above the main railway line with the Engine Shed to the right. To the north (below) are Bays 16 - 25 the Carriage Repairing Shop, the Paint Shop, various stores and on Wilson Street the Locomotive Engineers Office and the Locomotive (water tank with Calder House between them. SRAO EW7

4224

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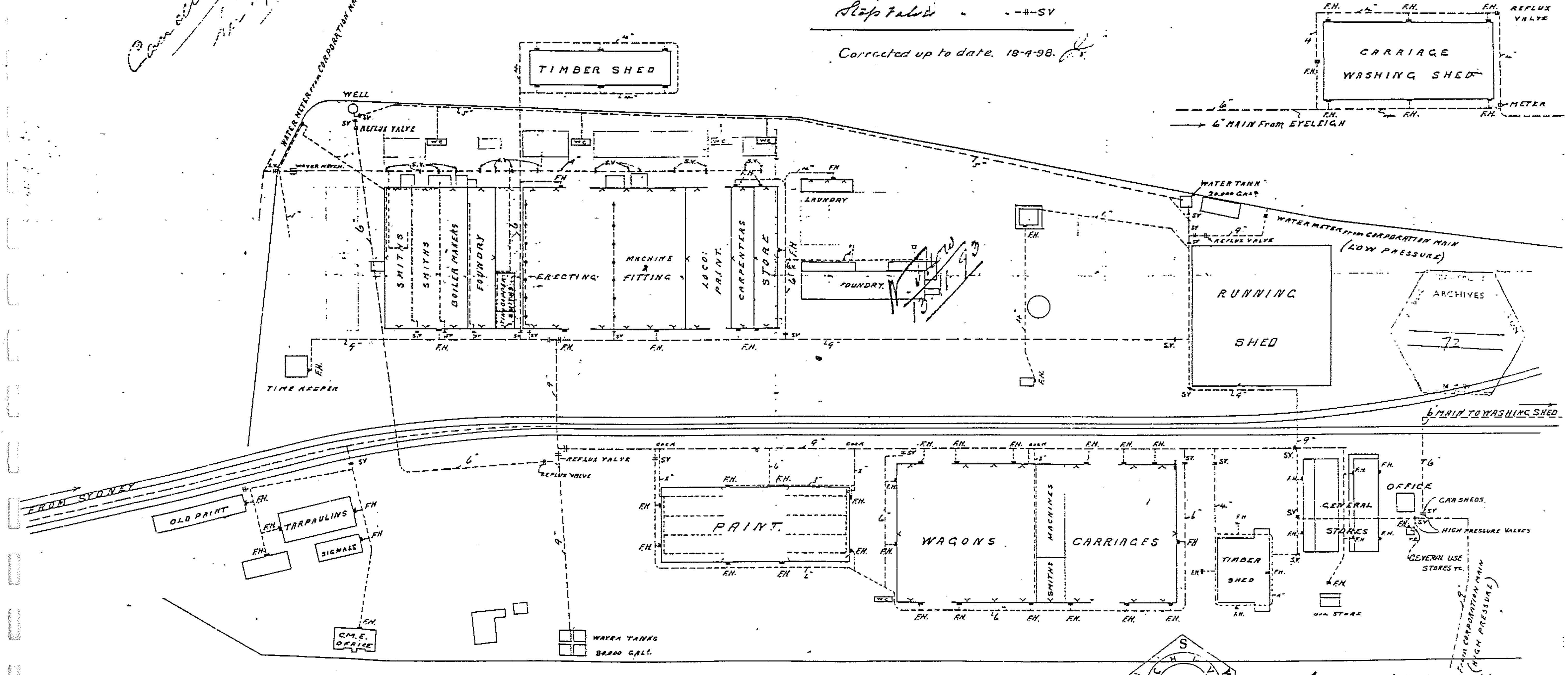
NEW SOUTH WALES GOVERNMENT RAILWAYS

Plan of Water Service – Eveleigh Workshops –

Note:– Fire Hydrants marked thus = F.H.
Stop Valves " – –#– SV

Corrected up to date. 18-4-98.



Scale, 1 Inch = 132 ft

108

Chief Mech. Engr. Office
Eveleigh 8th Nov. 1893

29.86

Plan 2. 4: Plan dated 1893, and updated in 1898 by the Eveleigh Chief Mechanical Engineers Office showing the water service. It shows the Locomotive Workshops still with their original functions but various ancillary buildings have been added around it, eg. foundry and laundry. SRA Plan Room.

EVELEIGH LOCO. WORKSHOPS

IN 1924.

Scale: 1" = 66'

Plan 2. 5: 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. SRA Plan Room.

3.5 THE LOCOMOTIVE WORKSHOP

3.5.1 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 yards 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 Chisolm 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.

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

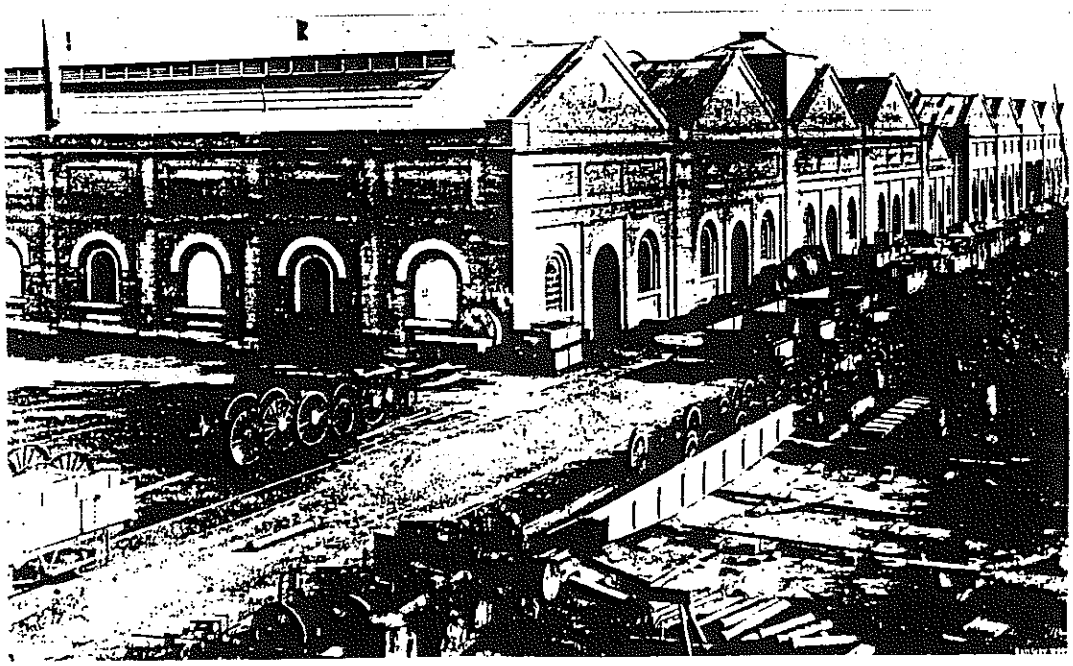


Illustration 1.17: View from the north, Eveleigh Workshops showing original configuration. Note eastern wall windows and Bay 4a. There is a turntable on tracks to Bay 1., 1884. ML GPO Video Disk 1 06678

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.

1899 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.

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.

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.

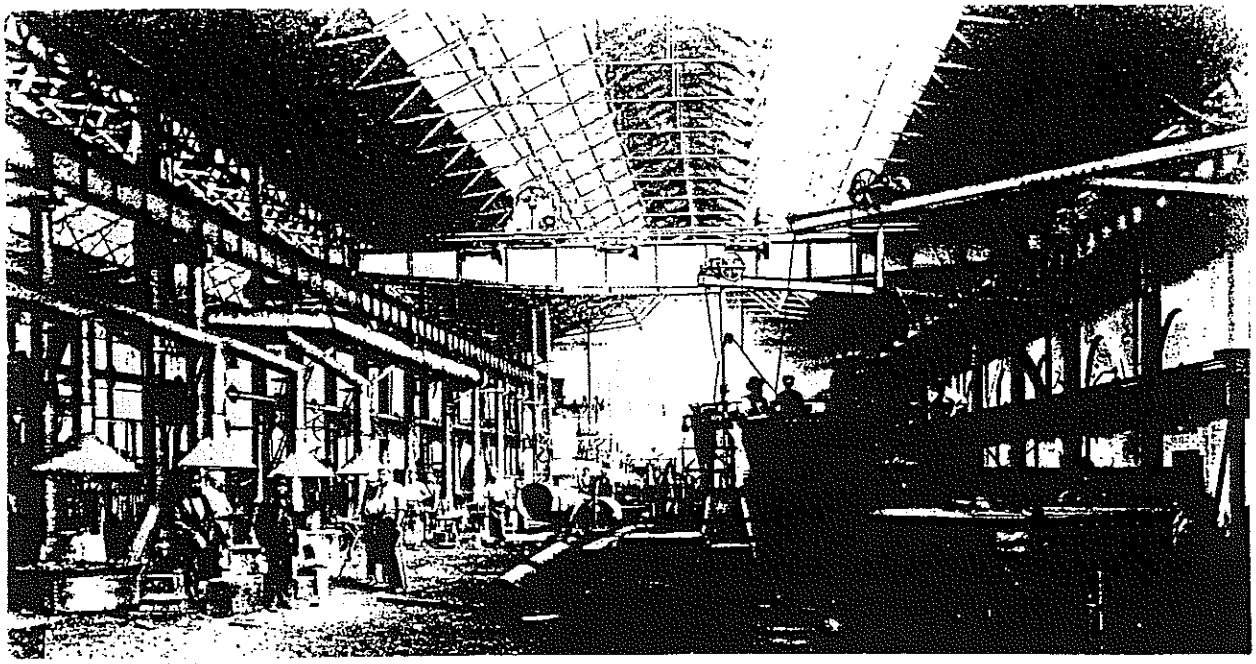


Illustration 1.18: Interior view looking south along Bay 3, prior to the wall on the right being demolished. Note the wall engine at centre back. The flues correspond with the flues on the original plan. ML GPO Video Disk 06681 Sh 976, 1884.

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.

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.

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.

Illustration 1.19: Eveleigh Rail Yard in 1910. The Spring Shop on the left. Note a second tower has been added and Bay 4a has altered, ML GPO Video Disc 1, 12018.

1914-18 *World War I.* War needs strained capacity of railways. Though workers supported the war it bought 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.

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 behind 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. (Shaw) private schools at Eveleigh.

Illustration 1.20: Schoolboys from Newington in the Eveleigh Workshops during railway strike, 1917, Newington College 1863-1963, p.89.

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

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.

1937 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.

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-gunshells.

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 ammunitions 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.

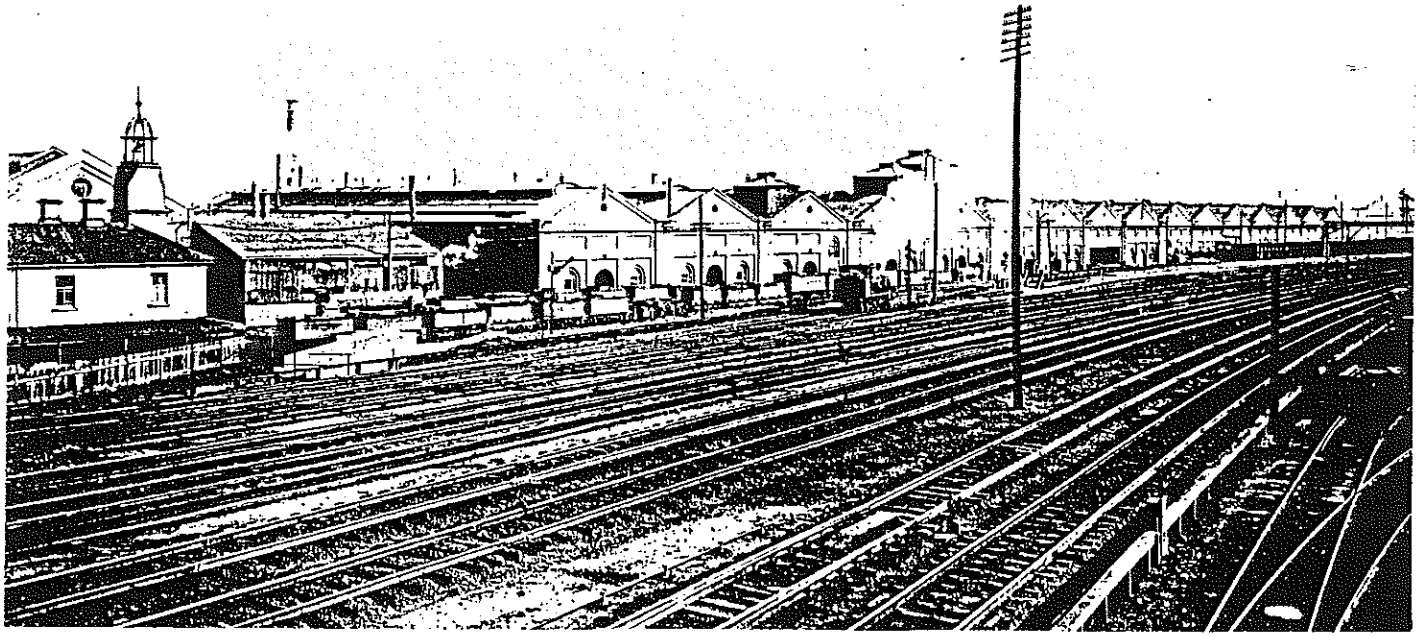


Illustration 1.21: View from Redfern overbridge. Bay 3 has a high level window. Note the chimney stack, the additional tower, which now total three, and the Spring Shop to the north of the Workshops. SRAO ELW 601/41

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.

An extension to the crane runway of the 5-ton crane in Bay 1 was undertaken in October.[1] (This crane runway was probably originally installed in 1925 with the Davy Press)

1947 Forty-eight, 25-cycle AC welding power points were installed around the workshops.

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 and whole shop was 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.

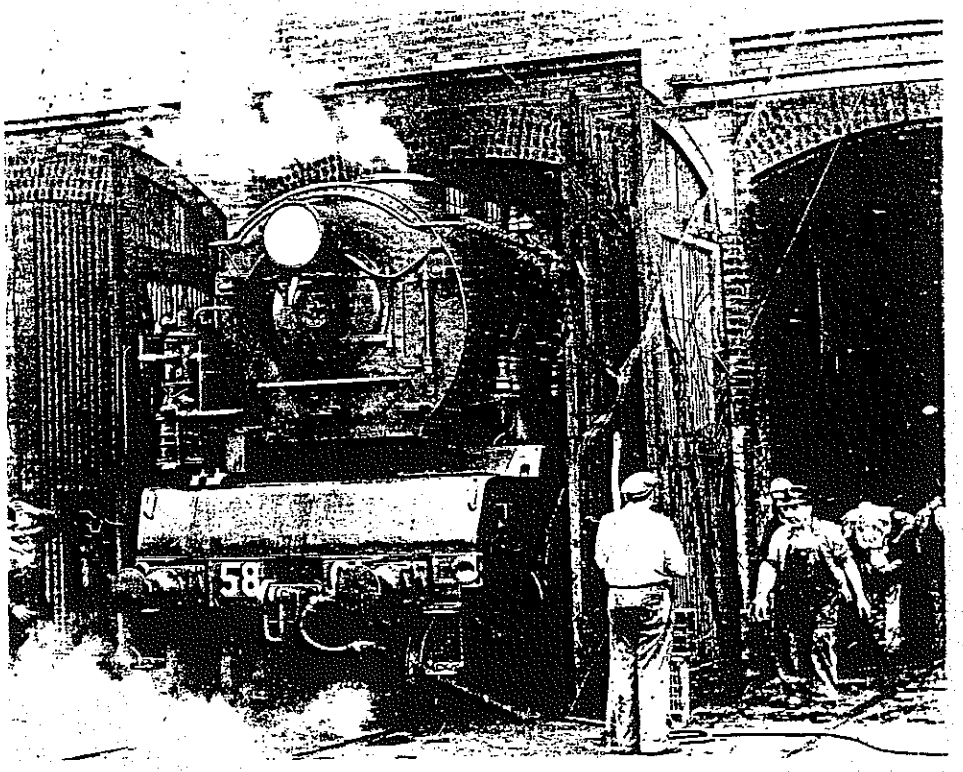


Illustration 1.22: Fitters at Eveleigh shepard 5801 from the Locomotive Workshops for the trial trip of 19th January 1950. The mountain type D58 was the largest locomotive built in Department workshops. Eleven were built at Eveleigh and another two at Cardiff, Burke, p.192.

1950's Contracting of work to private workshops increased due to lack of staff.

c.1965 Steam locomotion abandoned.

1970's 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.

1980's 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 Bay's 1-4a.

From 1989, buildings on site were progressively demolished over an extended period including the Pattern Shed, Foundry, Smith's Shops and most recently the Wheelpress Shop.

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.

Decontamination works were carried out to cleared areas of the site progressively.

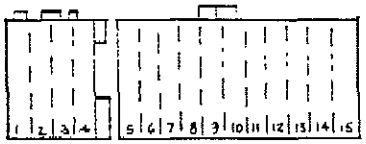
1994 Paddy's Market returns to Haymarket.

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.

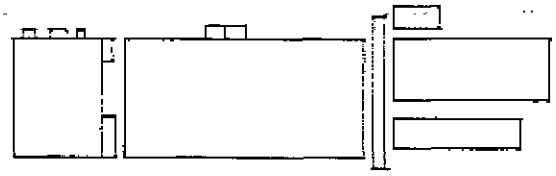
3.5.2 Sequence of Development

The main structure of the Eveleigh Locomotive Workshops were little altered in fabric or function (until its recent closure) from its original construction. There were many small additions and many functions moved from bay to bay or to other buildings. This section analyses the changes with particular reference to the plans held in railway archives and to historical photographs. See captions and notes on photographs and plans for additional information. The SRA plan room was visited and was found to hold some hundreds of plans relating to this building. Those obviously relevant were accessed but time did not allow for these records to be searched more thoroughly. 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.



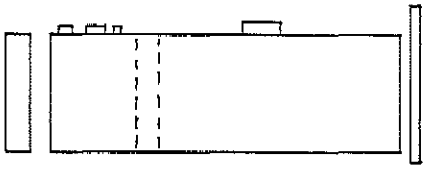
1887
Locomotive Workshops completed.

Bays	1887
1	Steam Hammer Shop
2	Smiths' 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



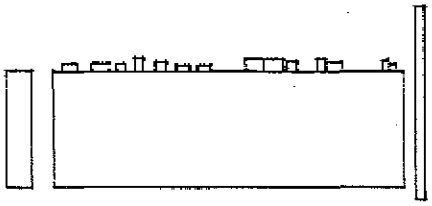
1901
The Large Erecting Shop, new Foundry and the Laundry have been constructed. The traverser was relocated from Bay 13 to south of the Locomotive Workshops.

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



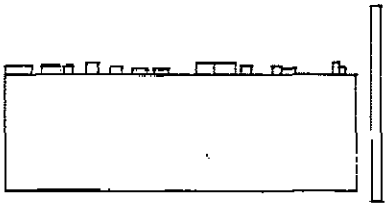
1905
The No.4a Bay has been enclosed and the Spring Shop established on the east side of Bay 1.

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



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

Bays	1924
1-2	lacksmiths
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 1970's to update the works. The Spring Shop was removed at about this time.

Bays	1984
1-2	Blacksmiths
3	New Spring shop/Heat Treatment
4-4a	Fabrication Shop
5	Fitting/Canteen
6	Millrights/Bar Store
7-8	Fitting Shop
9	Wheels and Axles
10-12	Machine Shop
13-14	Tool Room/Air Breaks
15	Rail Motor Test Room/Store

Illustration 1.23: Sequence of development..

CONTRACT N°4

N.S.W.R.

NEW WORKSHOPS EVELEIGH

FOUNDATIONS FOR WORKSHOPS N°1 TO 4

GENERAL SCALE 16 FEET TO AN INCH

SCALE OF DETAILS 4 FEET TO AN INCH

HALF END ELEVATION

HALF TRANSVERSE SECTION

HALF SIDE ELEVATION

HALF LONGITUDINAL SECTION

ENLARGED DETAIL OF TIMBER WORK

SECTION A.A.

SECTION B.B.

PART END ELEVATION

SECTION C.C.

SECTION D.D.

PART PLAN

N°1

STEAM HAMMER SHOP

N°2

SMITHY

N°3

BOILER SHOP

N°4

FOUNDRY

DETAIL OF PIERS ON LINE X.X.

DETAIL OF PIERS ON LINE Y.Y.

DETAIL OF PIERS ON LINE Z.Z.

SECTION E.E.

SECTION F.F.

PART SIDE ELEVAT

PART PLAN OF NORTH-WEST WAL

PART PLAN OF SOUTH-EAST WALL

HALF PLAN OF BRICKWORK

HALF PLAN OF TIMBER FOUNDATIONS

Commissioner for Railways

Chief Engineer

Plan 2. 7: 1883(?) drawing showing Bay 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. SRAO ELW 2.

Contract 18

NEW WORKSHOPS EVELEIGH

DETAILS OF SUPERSTRUCTURE SHOPS 1 TO 4

Drawing No. 1.

Scale 8 to 1 foot
Details 4 & 1 foot

FRONT ELEVATION

SYDNEY SIDE ELEVATION

FOUNDATION FOR INTERMEDIATE WALL

SECTION on LINE FF

SECTION on LINE KK

SECTION L.L.

Steam Hammer. Smithy. Boiler Shop. Foundry.

GENERAL PLAN

PART FRONT ELEVATION

Foundry. Boiler Shop Smithy Steam Hammer.

BACK ELEVATION

Blue lines represent where walls are to be left when finished up to top of existing roof.

MACDONALDTOWN SIDE ELEVATION

SIDE ELEVATION

SECTION on LINE AA.

WINDOW SILL

SECTION on LINE BB.

SECTION on LINE CC.

ENLARGED DETAILS OF COPING CORNICE &c.

Plan 2. 6: 1884 drawing signed by Cowdery showing the plan for Bays 1-4. Part is roof plan and part 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 elevations and sections are shown. The "front" or "Sydney side" elevation is what is now referred to as the north wall. SRAO EL_W 3.

N S W R

NEW WORKSHOPS EVELEIGH

SUPERSTRUCTURE SHOPS 5 TO 15

CONTRACT N°5B

72

DRAWING N° 1

OUTSIDE ELEVATION FRONT WALL

INSIDE ELEVATION BACK WALL

MACDONALDTOWN 35K ELEVATION

WALL C

WALL B

WALL A

TENDER SHOP

ENGINE

REPAIRING

SHOPS

WHEEL

MACHINE AND

FITTING SHOPS

PAINT

SHOPS

PATTERN SHOP

STORE

10 Ton Crane Girders

10 Ton Crane Girders

10 Ton Crane Girders

10 Ton Crane Girders

10 Ton Crane Girders

10 Ton Crane Girders

10 Ton Crane Girders

10 Ton Crane Girders

10 Ton Crane Girders

10 Ton Crane Girders

10 Ton Crane Girders

10 Ton Crane Girders

Plan 2. 8: Original plan of Bays 5 to 15 is dated 18 ? and signed by George 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. Foundations 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, numbers 7 & 13. SRAO ELW 18.

CONTRACT N° 5

N. S. W. R.

NEW WORKSHOPS EVELEIGH

DRAWING N° 1

FOUNDATIONS AND PITS SHOPS 5 TO 15

Scale. 4 in. = 1 foot

ELEVATION OF END WALL

SECTION ON LINE EF

SIDE WALL C

PLAN

SIDE WALL D

ELEVATION OF SIDE WALL

Plan 2. 9: Plan of Bays 5 to 15 dated 1884 and is signed by George 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. SRAO ELW 15.

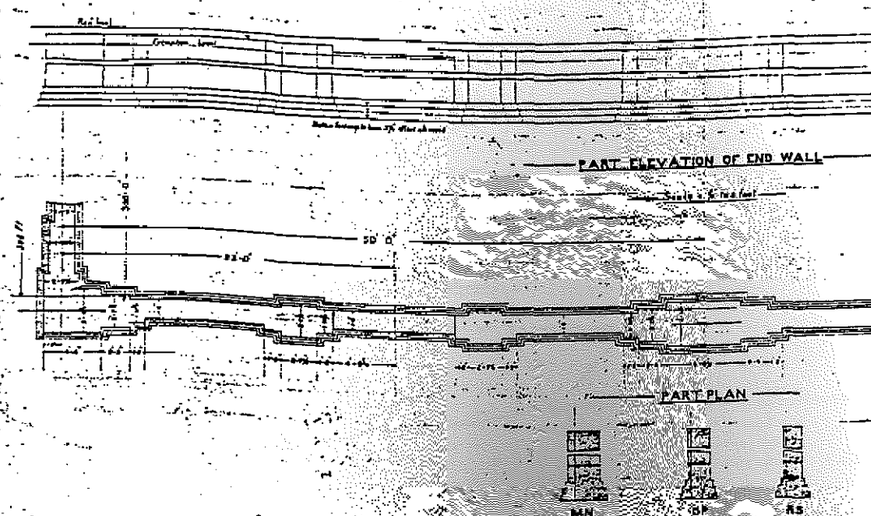
CONTRACT N° 5

N . S . W . R .

NEW WORKSHOPS EVELEIGH

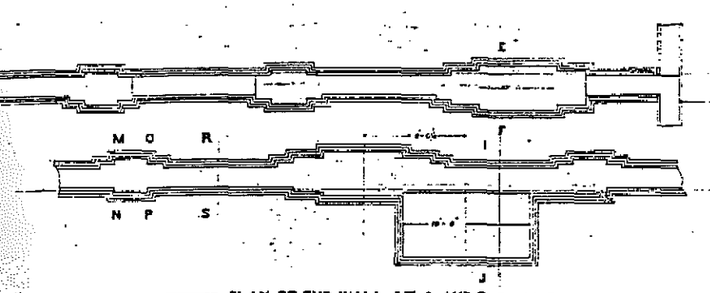
DRAWING N° 2

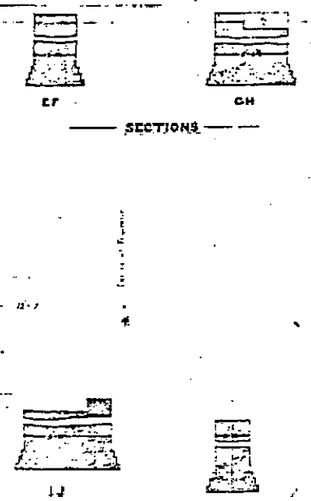
DETAILS OF FOUNDATIONS AND PITS SHOPS 5 TO 15.

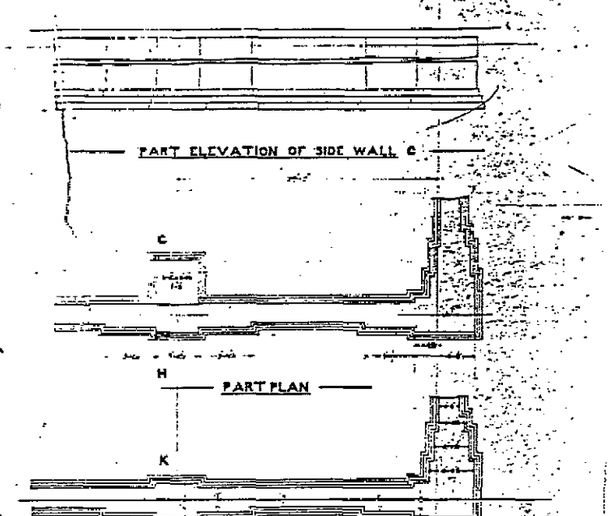

PART ELEVATION OF END WALL

PART PLAN

SECTIONS


PLAN OF END WALL AT A AND B


SECTIONS

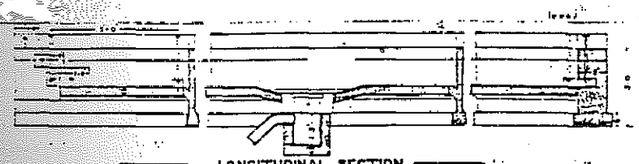

PART ELEVATION OF SIDE WALL C

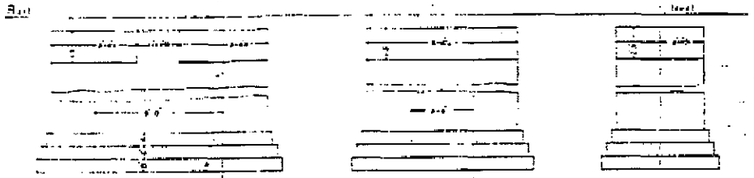
PART PLAN

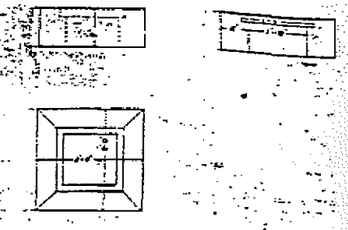
PART PLAN OF SIDE WALL D

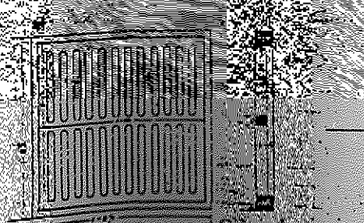

SECTION THROUGH AB

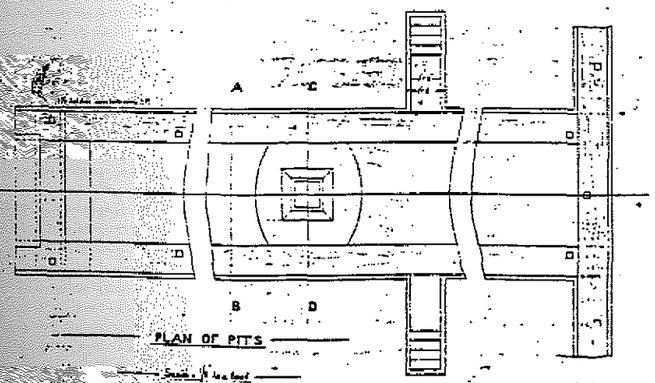
SECTION THROUGH CD

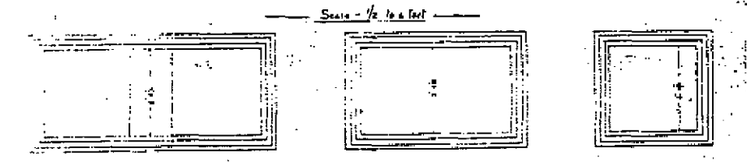

LONGITUDINAL SECTION


ELEVATION


SINK STONE

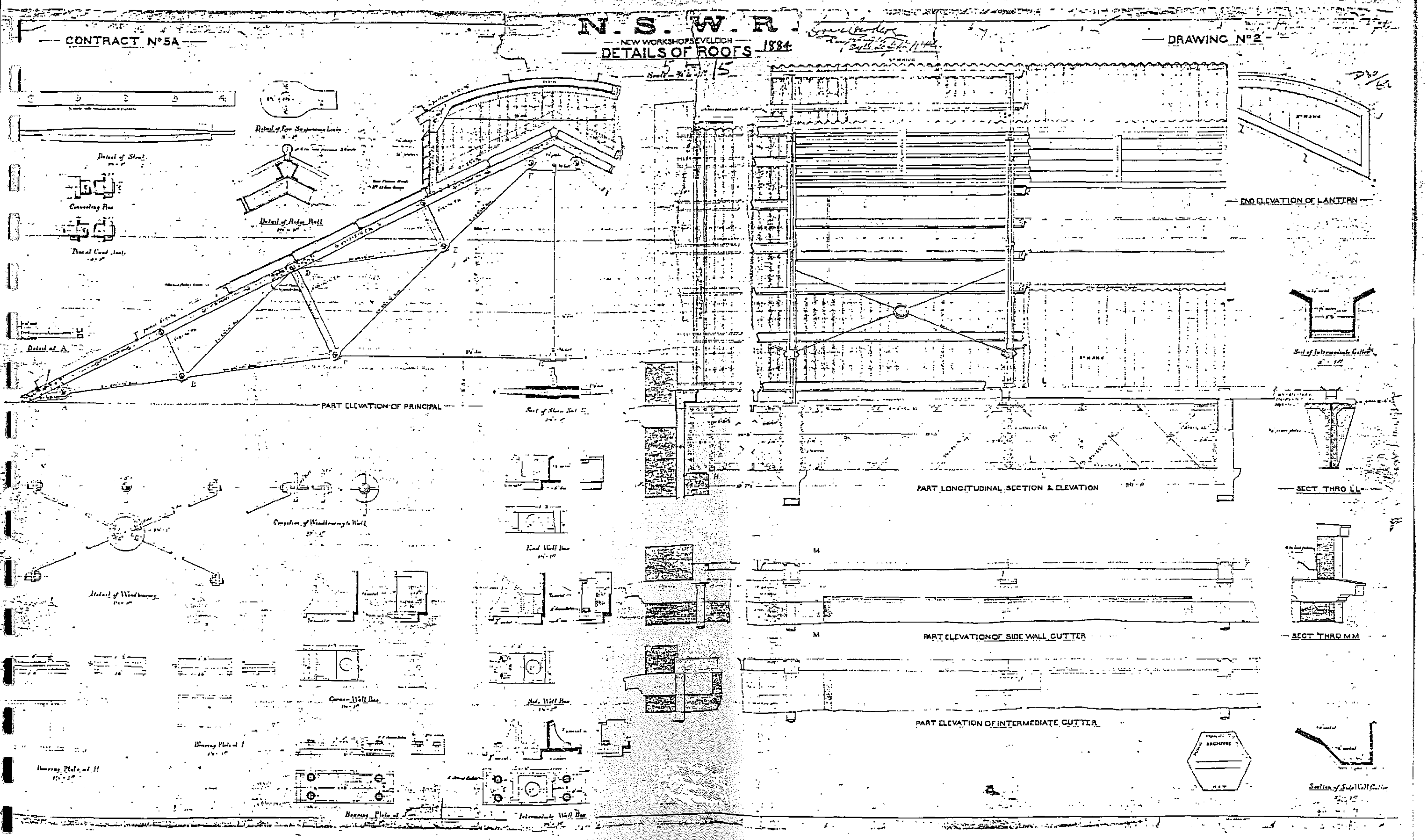

GRATING FOR SINKS


PLAN OF PITS


PLAN OF PIERS

PW 008

Plan 2. 10: 1884 drawing showing the Bays 5-15 pits and footings 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. SRAO ELW 16.


CONTRACT N°5A
N. S. W. R.
NEW WORKSHOPS EVELEIGH
DETAILS OF ROOFS
1884
DRAWING N°2
Detail of Strut
Connecting Pins
Detail of Eye Suspension Links
Detail of Ridge Roll
END ELEVATION OF LANTERN
Detail at A
PART ELEVATION OF PRINCIPAL
Sect of Intermediate Gutter
PART LONGITUDINAL SECTION & ELEVATION
SECT THRO LL
Connection of Windbracing to Wall
End Wall Box
Detail of Windbracing
PART ELEVATION OF SIDE WALL GUTTER
SECT THRO MM
Corner Wall Box
Side Wall Box
PART ELEVATION OF INTERMEDIATE GUTTER
Bearing Plate at J
Bearing Plate at H
Intermediate Wall Box
Section of Side Wall Gutter
ARCHIVES

PW 013

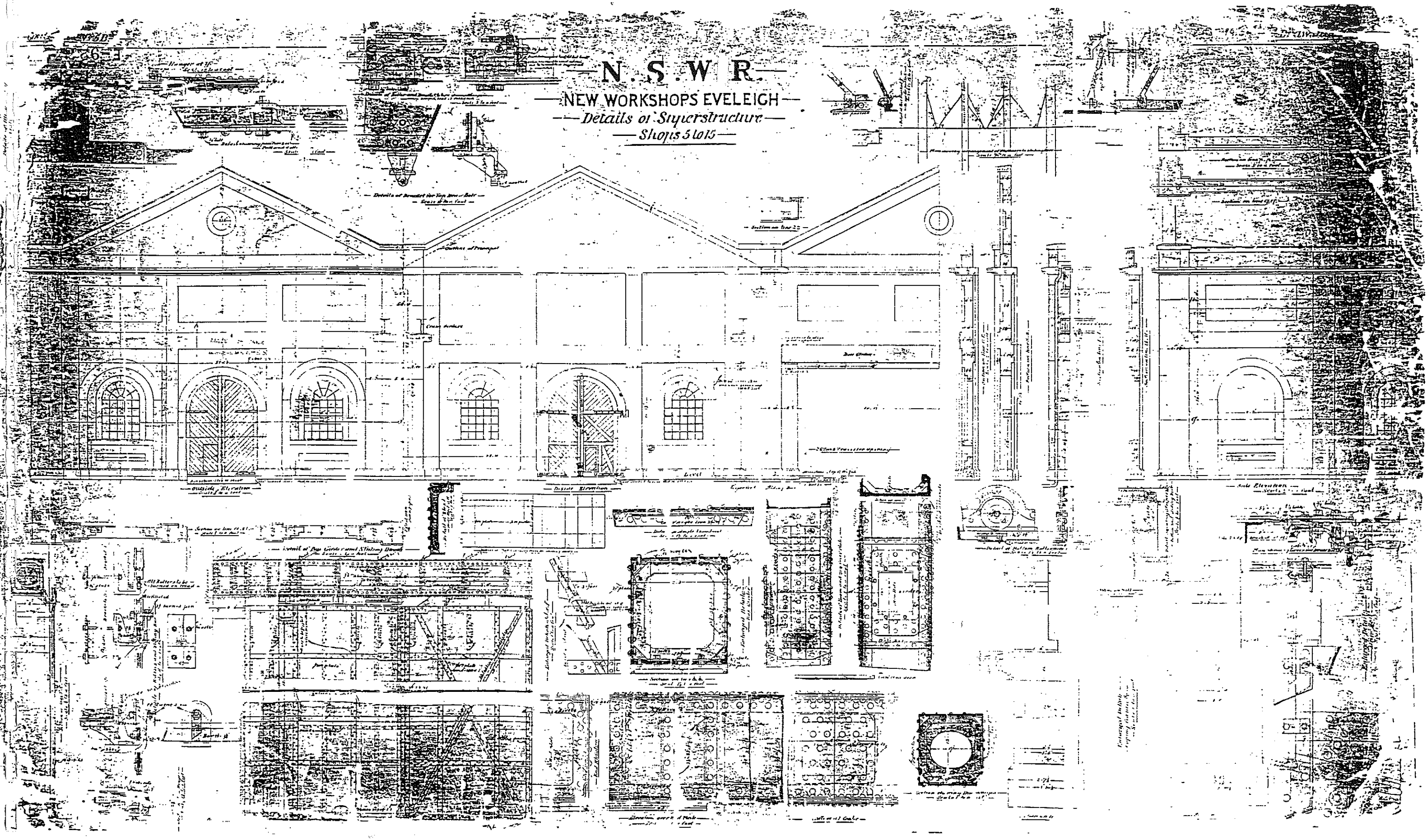
Plan 2. 11: The roofs are shown here in great detail including the lantern structure and end and side elevations. Also shown are the truss and the strut detail, and detailed sections and elevations of cast iron gutters and various wall boxes into which the gutters discharge. SRAO ELW 21.

N.S.W.R.

NEW WORKSHOPS EVELEIGH

Details of Superstructure

Shops 5 to 15



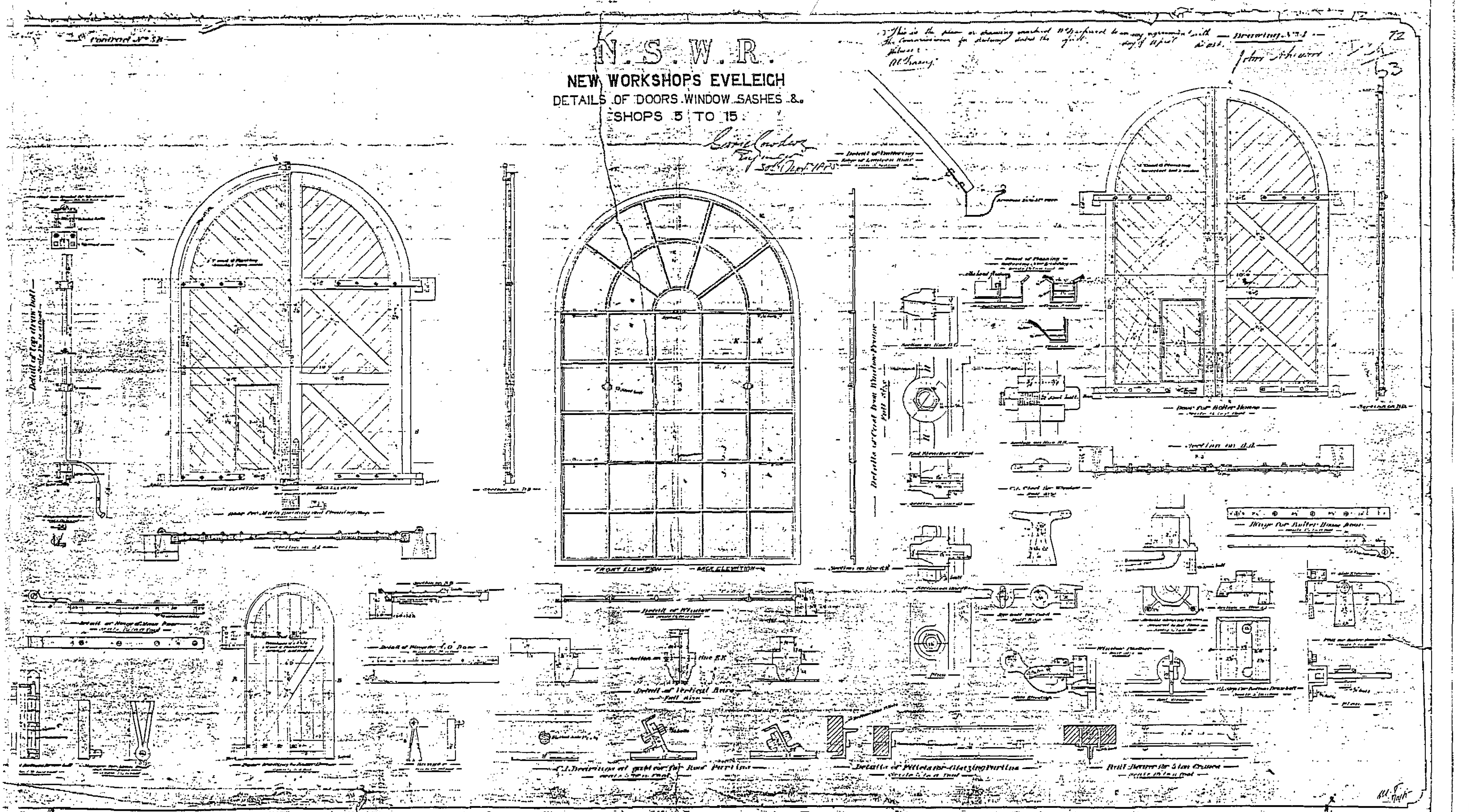
Plan 2. 12: Details of the walls are shown including elevations and sections, coping stones and cornice, cast iron downpipes in the wall and details of the large iron, riveted sliding doors to the traverser bays. These no longer exist. SRAO ELW 17.

N.S.W.R.

NEW WORKSHOPS EVELEIGH

DETAILS OF DOORS WINDOW SASHES &c.

SHOPS 5 TO 15



Plan 2. 13: The detailed drawing of windows, doors and gutters indicate the high level of detail to which the building was deliberately designed with 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. SRAO ELW 22.

3.5.3 Locomotive Workshops Operational History

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, but their main tasks were for 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 facilities 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 cast iron tuyeres serving a cast iron fire bed covered in fire brick. The cast iron tuyeres (air inlets) were watercooled. Air was supplied via blowers erected against the south wall of Bays 1 and 2. The air reached the machinery through underground pipes which still exist and are operational. The precise type of hammers which 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.

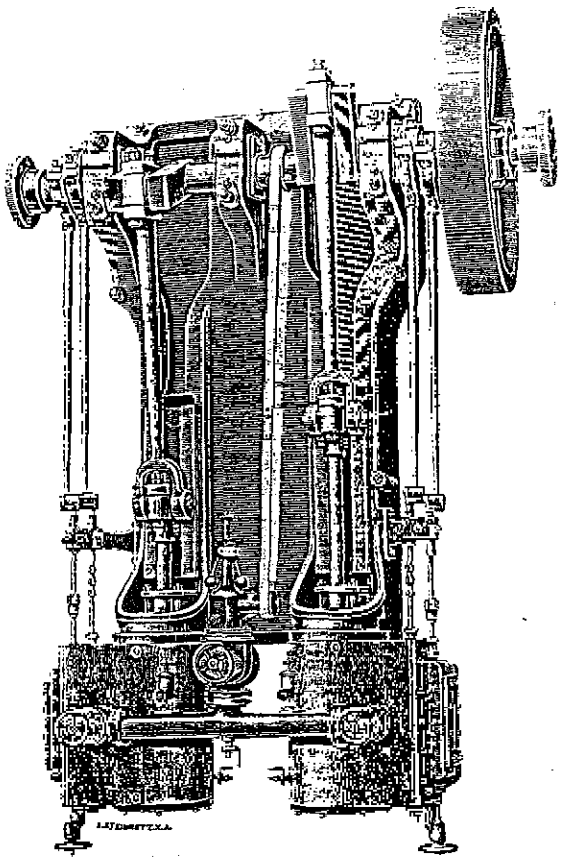


Illustration 1. 24: Steam driven wall engine of the type used at Eveleigh to drive crane and possibly line shafts. SRAO ELW 601/49.

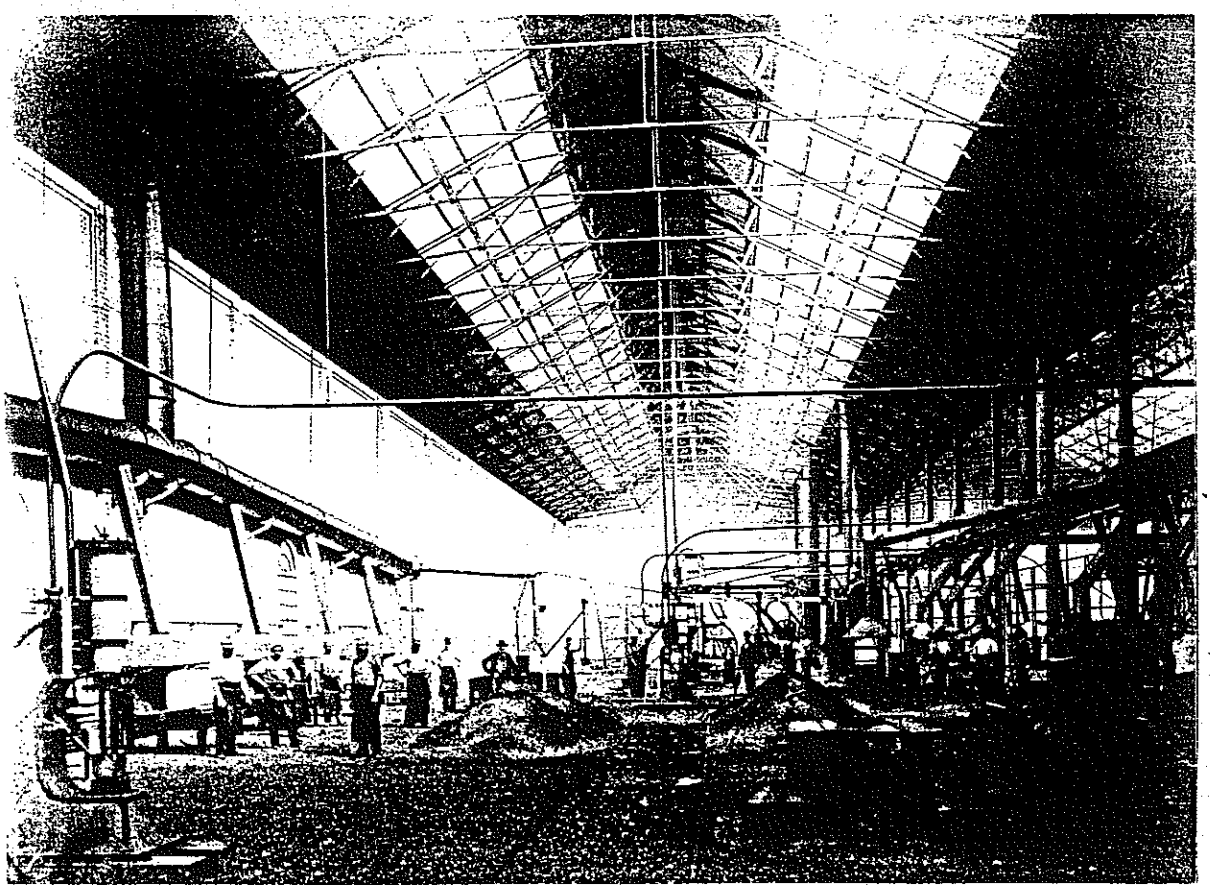
The boiler shop was equipped with larger forges than found in the Blacksmiths shop. On the early drawing, these forges are called Boilersmith fires and there is a total of five fires, each with a hearth area at least four times of that of the normal smiths forges. It is apparent that the boiler shell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

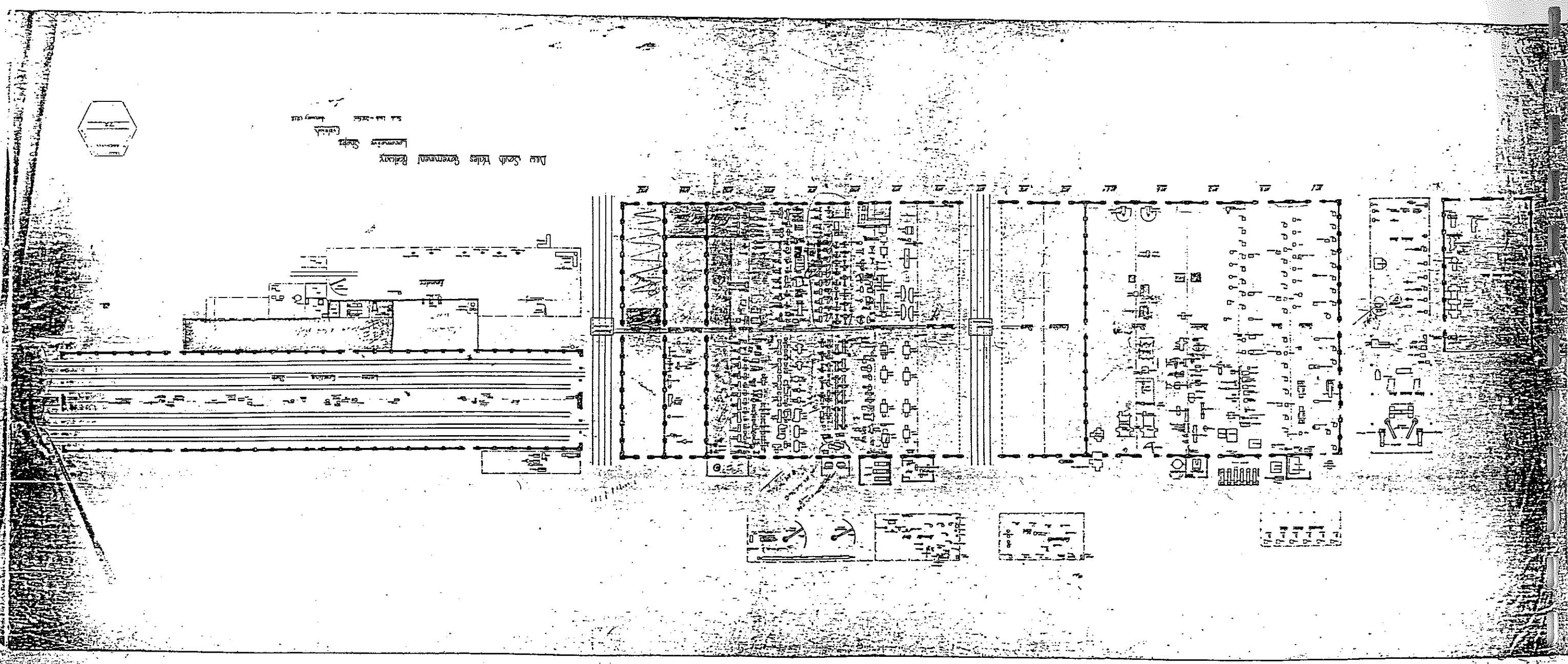
All of the flues from the forges, which were vertical, passed into an almost horizontal overhead flue which was about a metre in diameter. This overhead flue then passed into two 10m high stacks which were also about 1m in diameter. These steel stacks appear not to have been equipped with an induced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

The second group of bays, Bays 5-15, Bays 5, 6, 7 and 8 comprised 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.

Illustration 1. 25: 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.





Plan 2. 14 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 in detail at this time. Much of the information is only legible by viewing the SRA Archives apeture card. Many of the machines in Bays 1-4 are still in these locations. The plan shows the chimney stack at the southern end of Bay 2 and the hydraulic accumulator at the southern end of bay 4. SRAO ELW 29.

STEAM HAMMER SHOP

SMITHS SHOP

BOILER SHOP

BOILER SMITHS FIRES

— N. S. W. R. —

NEW WORKSHOPS EVELEIGH

ARRGT OF SMITHS FIRES & FLUES Part

OBSOLETE OBSOLETE OBSOLETE

DRAWING Nº 1390 1391 1392

SCALE ¼ INCH TO A FOOT

Plan 2. 15 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 elevations of each installation are shown in the plan of the bay above. SRAO, ELW 26.

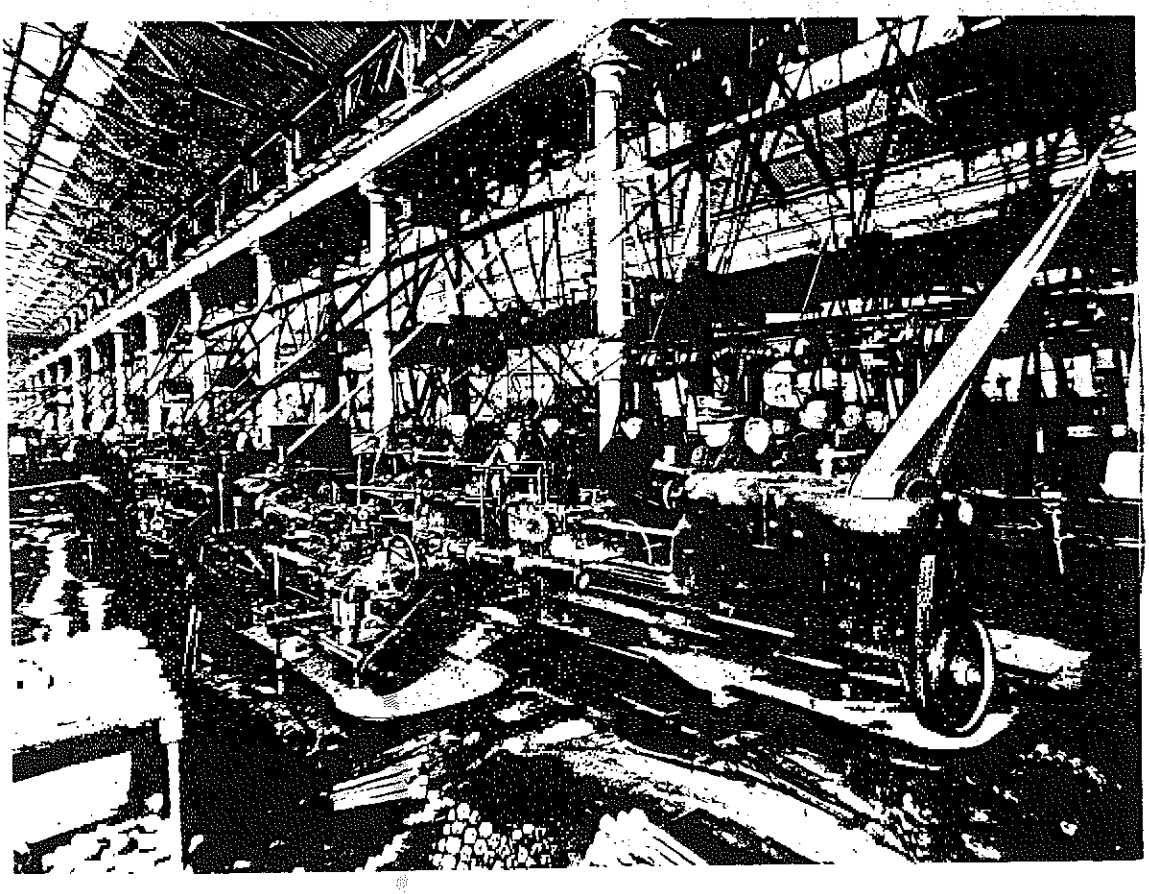
The machine and turning shop was powered by a line shaft and a series of countershafts again powered by the twin-cylinder steam engines on the south wall. Belts ran, usually, from the countershafts to lathes, shapers, grinders and milling machines which were located on the floor of Bays 9, 10 and 11. 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.

Safety

In the early photographs, it is evident 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.

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 removal of parts and locomotives and rolling stock between the workshops and the new erecting shop.

Illustration 1. 26: Machine Shop lathes belt driven from counter shaft. Bay 10 or 11 looking south from northern end of bay. Screwing crown stays. SRAO ELW 601/23.



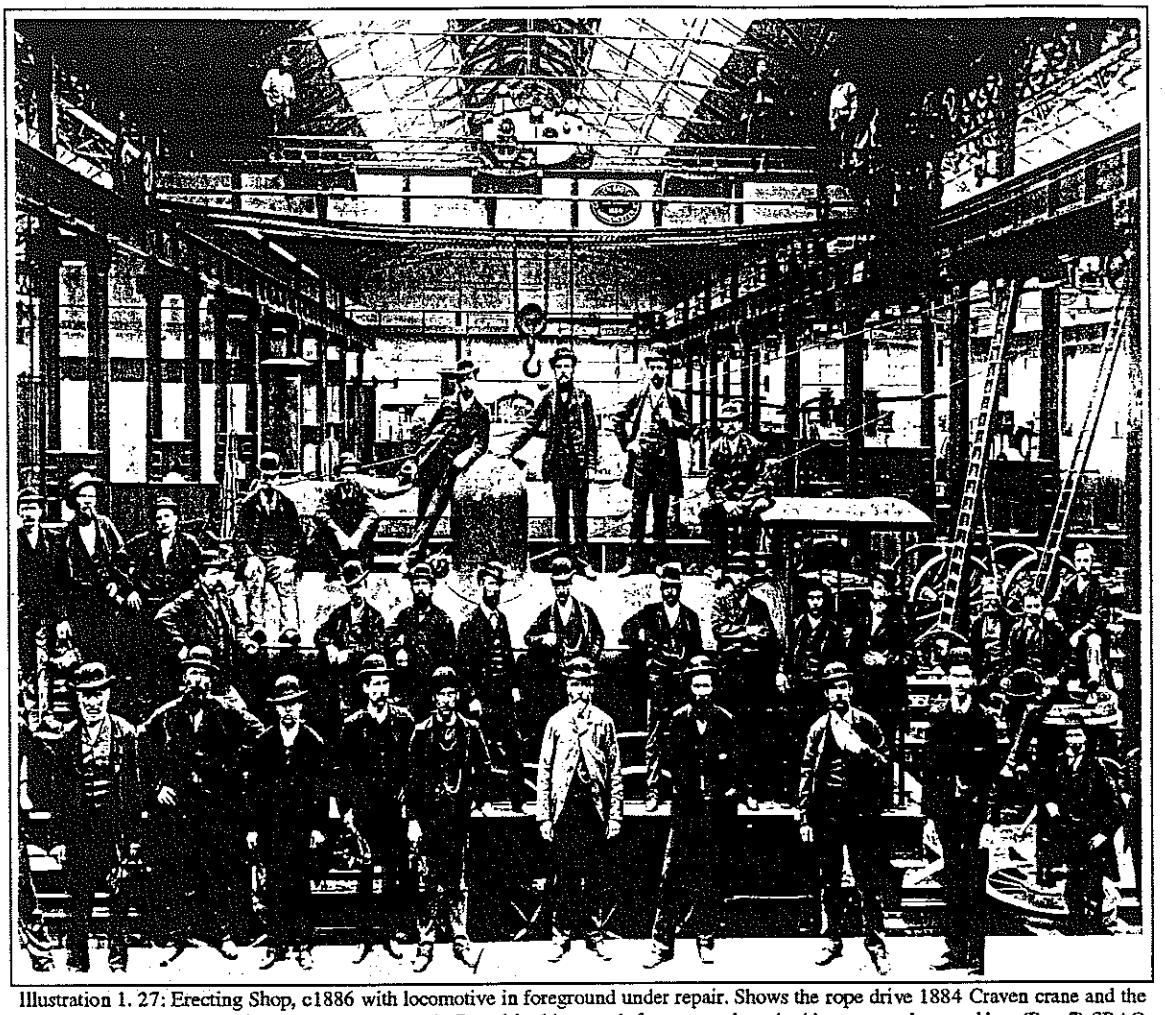


Illustration 1. 27: Erecting Shop, c1886 with locomotive in foreground under repair. Shows the rope drive 1884 Craven crane and the workmen dressed up especially for the photograph. Bay 6 looking north from central road with traverser bay on l.h.s. (Bay 7).SRAO ELW 601/1 7

Illustration 1. 28: Wheel Shop, Bay 9 looking south, showing wall engine on back walll l.h.s. The counter shafts are shown suspended under the column headstock with helts driving counter shafts fixed to girders between the columns. Machines were driven hy belts directly off the line shaft or off the counter shafts. Note the wheels on the centre road and the overhead travelling crane. SRAO ELW 601/19.

Eveleigh for some time had had its own gas works which were located near Macdonaldtown Station. A small generating unit had been constructed close to the running shed which 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 east 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. 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.

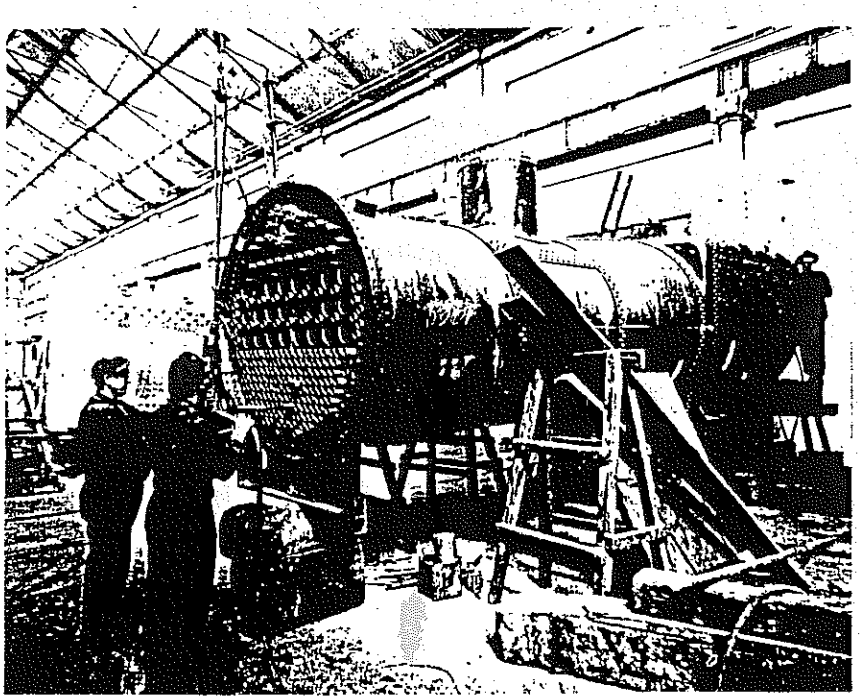


Illustration 1.29: Bay 4a looking south-west showing rolling of tubes with pneumatic tube expanders to D53 class boiler. SRAO ELW 601/47.

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.

To supplement the forging capacity of the workshops, the massive 1500 ton Davey 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.

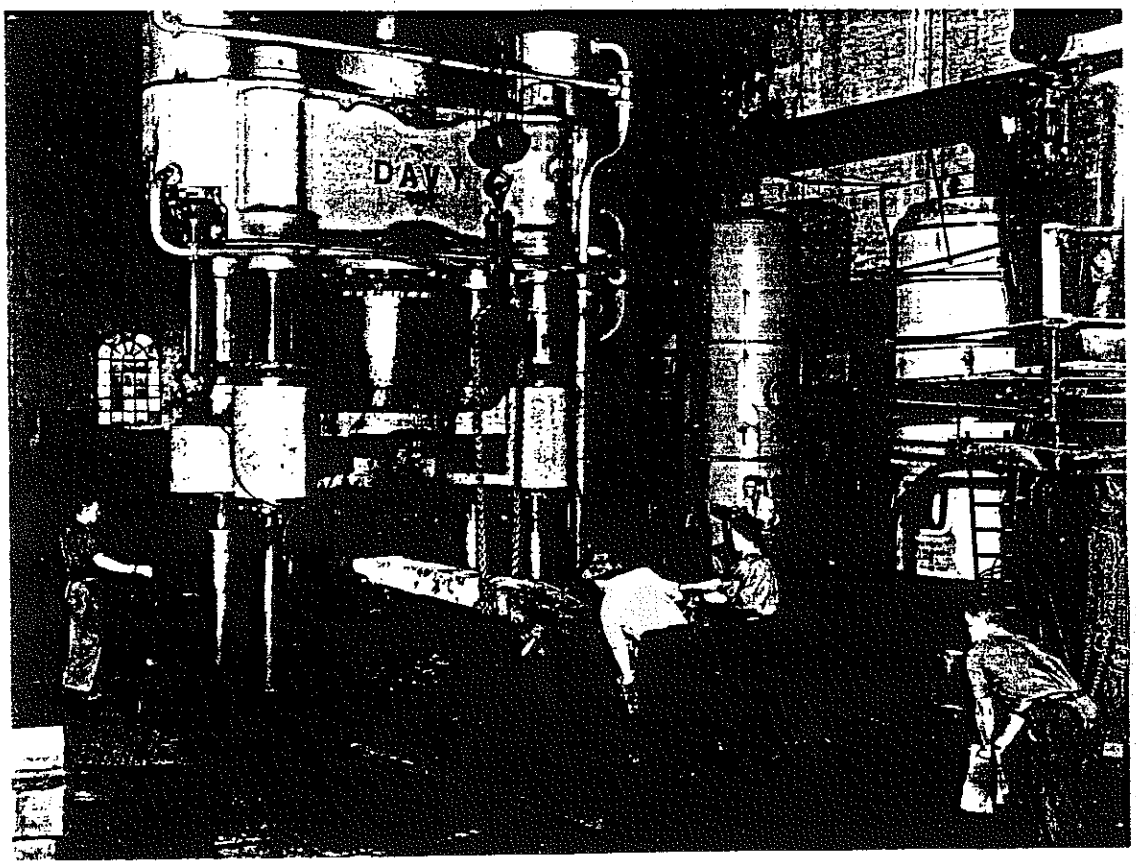


Illustration 1.30: Bay 1 north looking north, showing Davy Press in operation. Supervisor on the left, operator at handle on right, pressing white hot metal manipulated by three men through balanced tongs supported from overhead crane. Note boiler on r.h.s.. SRAO ELW 601/29

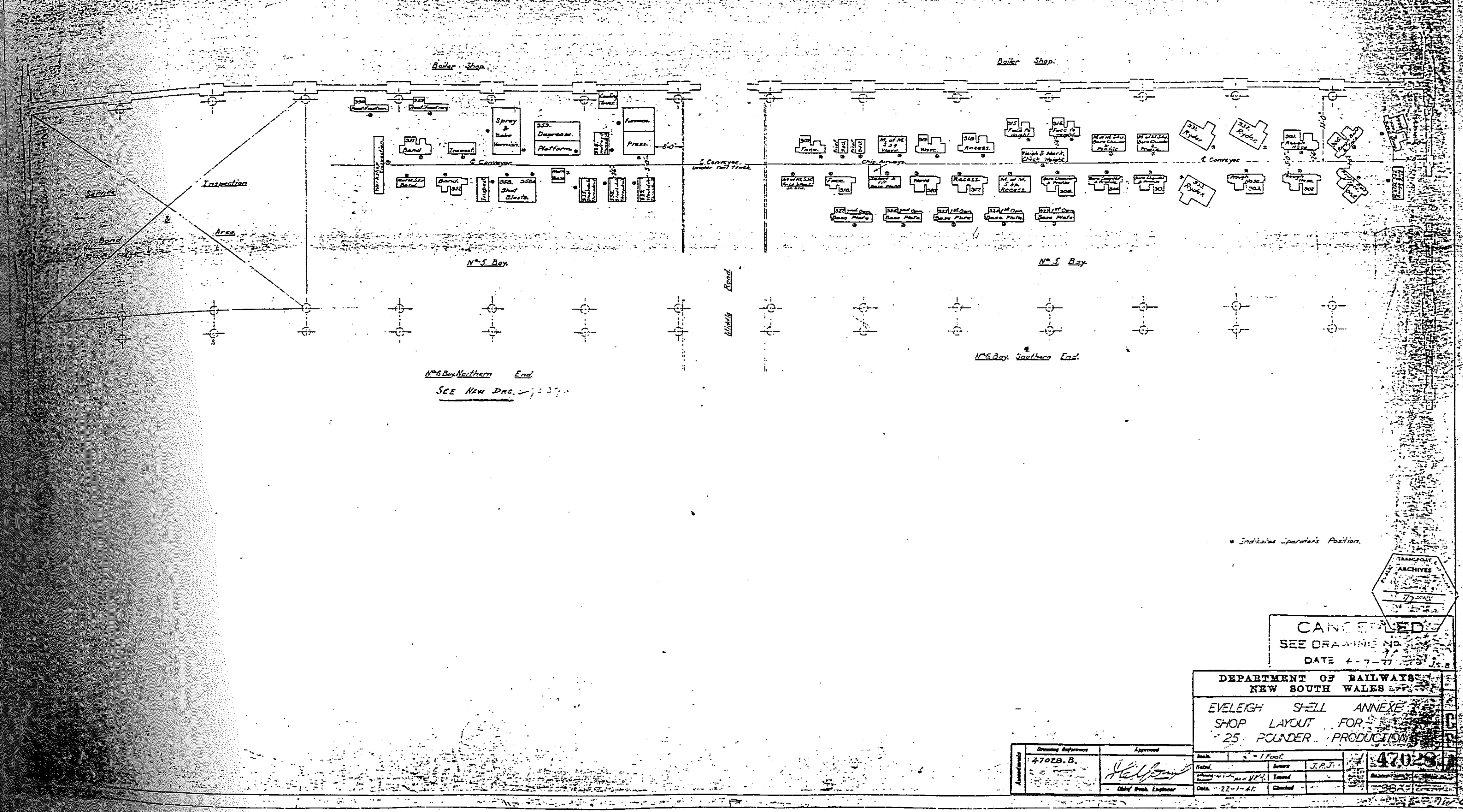
World War II

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 (see Plan). 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.

Post War

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 integrated 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 loco maintenance and repair, entered its final phase.

The 1970's re-organisation and attempt 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 remains as 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 the 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 store room 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.


Boiler Shop.
Boiler Shop.
Service
Inspection
&
Area
Band
No. 5. Bay.
No. 5 Bay.
Middle Road
No. 6 Bay. Northern End
SEE NEW DRG.
No. 6 Bay. Southern End.
C. Conveyor
C. Conveyor under rail track.
Chip Airways
C. Conveyor
Spray & Bake Varnish.
353. Degrease. Platform.
Furnace.
Press.
Inspect.
Band.
Shot Blasts.
Face.
Recess.
Rough Nose.
Ryder.
Base Plate
• Indicates Operator's Position.
TRANSPORT ARCHIVES
CANCELLED
SEE DRAWING No.
DATE 4-7-77
DEPARTMENT OF RAILWAYS
NEW SOUTH WALES
EVELEIGH SHELL ANNEXE
SHOP LAYOUT FOR
25 POUNDER PRODUCTION
Drawing Reference
47028. B.
Approved
Chief Mech. Engineer
Scale ¼" = 1 Foot.
Drawn J.P.J.
Date 22-1-41.
47028

Plan 2. 16 1941 plan of shop layout in Bay 5 showing the layout of machiaery for the prodactioa of 25 pounder shells for WW2. This provides detailed evidence of the association of the workshops with the war effort. SRAO ELW 31.

3.6 JOHN WHITTON & GEORGE COWDERY

John Whitton

Whitton was born in Yorkshire in 1820. His initial railway experience was with John Billington (his mothers maiden name was Billington) preparing plans and tenders for railway construction and waterworks. He later was engineer for the Manchester, Sheffield and Lincoln railway (1847) and the Oxford, Worchester and Wolverhampton line (1852-6). He arrived in Australia in 1856 as the engineer-in-chief to layout and superintend the construction of railways in NSW.

He found himself at odds with the Governor and the government on a range of issues such as the gauge and the quality of works. Whitton argued for a wider gauge and extension of the network. He was subject to allegations of fraud by John Fowler which were disproved and there was friction between Whitton and Goodchap, the Commissioner. He supervised unprecedented growth in the railways with 1,000 miles of new track between 1880-85. He retired in 1890 and died in 1898.
Notes from ADB Volume 6:1851-1890.

George Cowdery[1]

Cowdery, born in 1830, was the son of an English railway engineer who worked for Betts & Macintosh, private contractors. As a child he travelled extensively around England as his father moved from site to site. George 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 & Holyhead Railway through the Isle of Anglessey (which his father was in charge of) George first met Robert Stephenson who was building the tubular Britannia Bridge over the Menai Straits. Cowdery worked on the Oxford, Worchester and Wolverhampton railway for Peto & Betts. It was here during work on timber piles to large timber truss bridges that he met Mr John Whitton and John Fowler both of whom he later worked for in NSW. These 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, p.305).

Work was slow in England because of the Crimean War and Cowdery came to Australia in 1856 with letters of introduction to the Governor of Victoria. He found regular employment constructing roads and surveying new railway lines in Victoria. He 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.

[1] All notes on Cowdery from Cowdery's "Life Sketch", Manuscipt ML/AC163 and from "The Greatest Public Work, The NSW Railways, 1848-1889" by Robert Lee.

Cowdery built the first two large 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, including the supervision of the completion of the famous Zig-Zag line at Lithgow. In the early 1870's railway work almost ceased and the lure of gold at Hill End caused Cowdery to temporarily abandon the railways. 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 rail beyond Goulburn then Grafton to Glenn Innes, then Orange to Narromine.

In 1878 Cowdery was appointed the Deputy 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. In 1880 he was appointed Chief Engineer for Existing Lines and Tramways and began to plan the new railway workshops and running sheds at Eveleigh, reputed to be the first use of an arched truss roof for engine sheds. This form of truss roof had been in use for train sheds (ie over platforms) since Brunel's Paddington Station, 1850-4. Cowdery also widened the Redfern Tunnel under Cleveland Street and quadrupled the mainline through Homebush.

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. Cowdery appears to have retained his position despite his obvious, and very public, difference of opinion with Whitton.

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.

3.7 THE MACHINERY

3.7.1 General

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 has 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).

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.

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

3.7.2 The Hydraulic System

The original hydraulic system n 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 No. 2.13) 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 operational in Sydney and possibly Australia.

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.

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) 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 Davey 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.

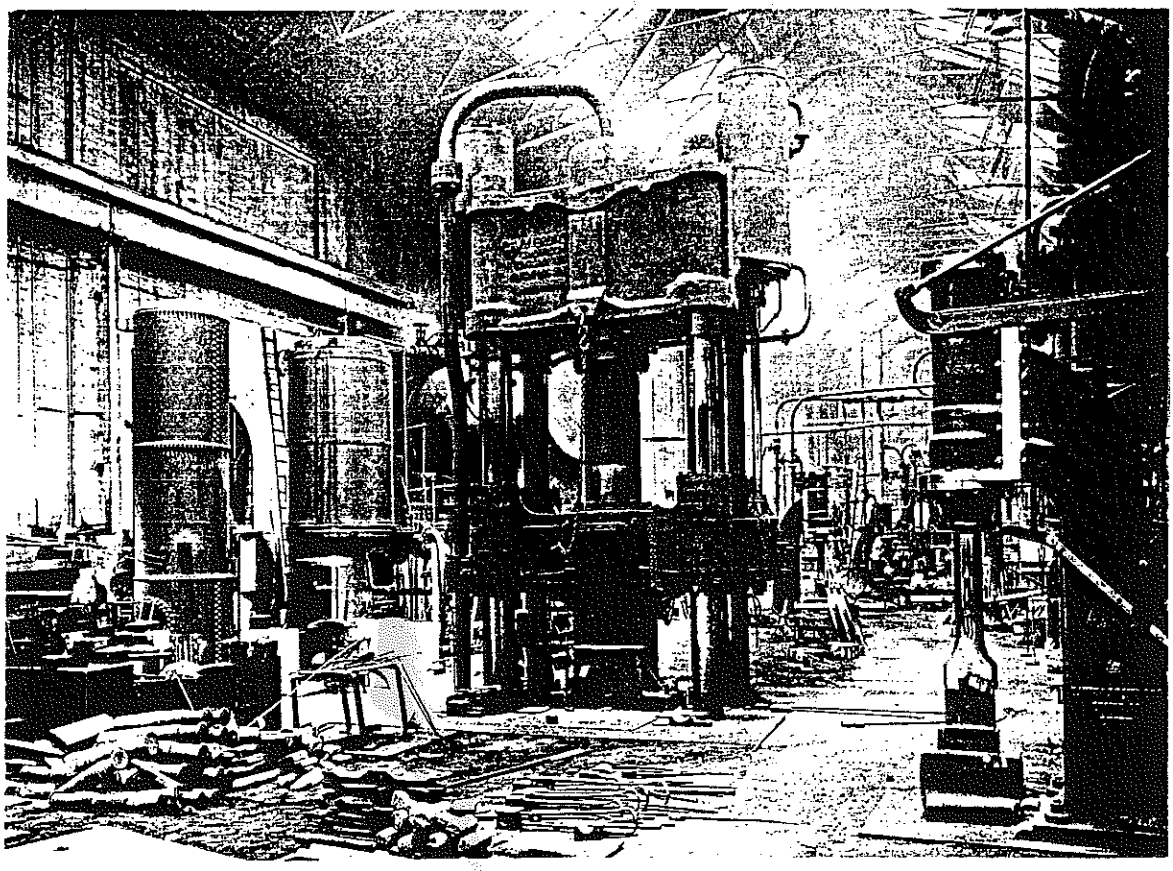


Illustration 1.31: The Davy Bros. Press in Bay 1 north looking south. Taken some time after installation with the Davis and Primrose 8½ Cwt steam hammer in the right foreground with three steam hammers in the background the most distant one being the arch hammer. All steam hammers are shown on the 1912 plan. 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 which 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 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 (see section 4.6 for locations). 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*** are both now located in Bay 4 south. Their original position is not known hut both were probably originally powered from line shaft or counter shaft. Neither of the machines is shown in its present location 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 which 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.

The ***overhead cranes*** throughout the workshops are in their original location. It was not normal practice to move a crane to a different location simply 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 either in the new steam hammer shop and in the wheel press shop.

4. PHYSICAL ANALYSIS

4. PHYSICAL ANALYSIS

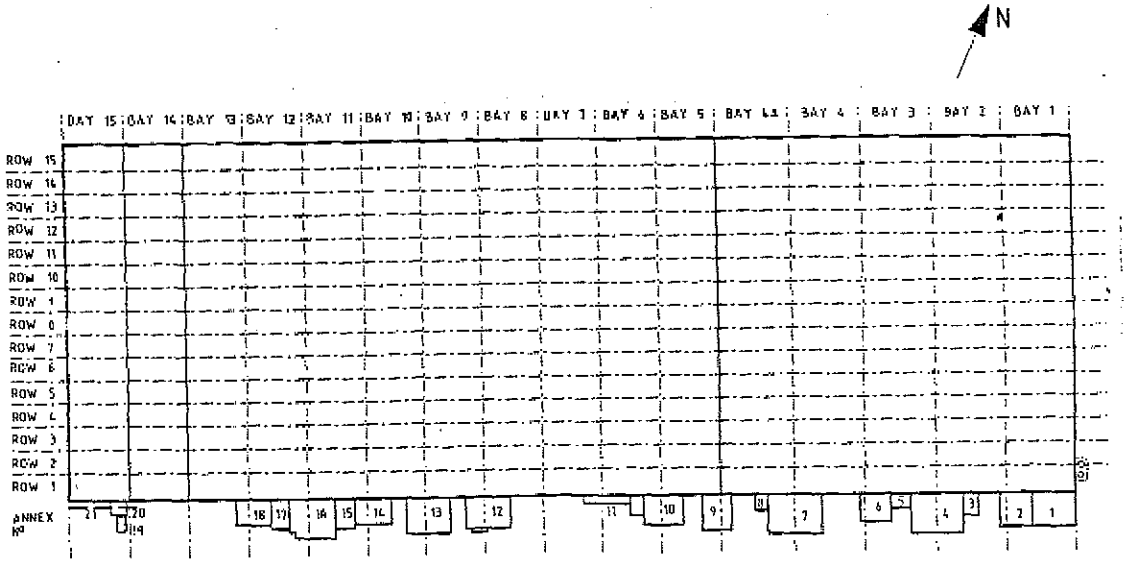
4.1 METHODOLOGY

The architectural analysis of the building is based on inspections by Otto Cserhalmi, Jean Rice and Don Godden during February and March 1995. The structural analysis is 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. Diagramatic plans locating machinery in Bays 1 to 4 are included in Appendix E.

The inventory is a separate document which analyses the east wall and part of the north and south walls in detail. The inventory also comments on condition and significance and recommends appropriate treatment. Recording of the building by means of video should be considered.

A numbering system has been used consistent with that used by Rice Daubney in other reports and shown on the plan below.



Plan 3. 1: Plan of the Locomotive Workshops

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 comprises parallel bays. Bays 1-4 are 60 foot wide and Bays 5-15 are 50 feet wide. Their configuration is shown on the plan which shows 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.

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. Alternately 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.

Internal Planning

The building generally has a rectangular "footprint". The interior of the building comprises large open bays with open views in both directions across the building and diagonally. There is a wall between Bays 4a/5, 13/14 and 14/15 creating the major internal subdivisions.

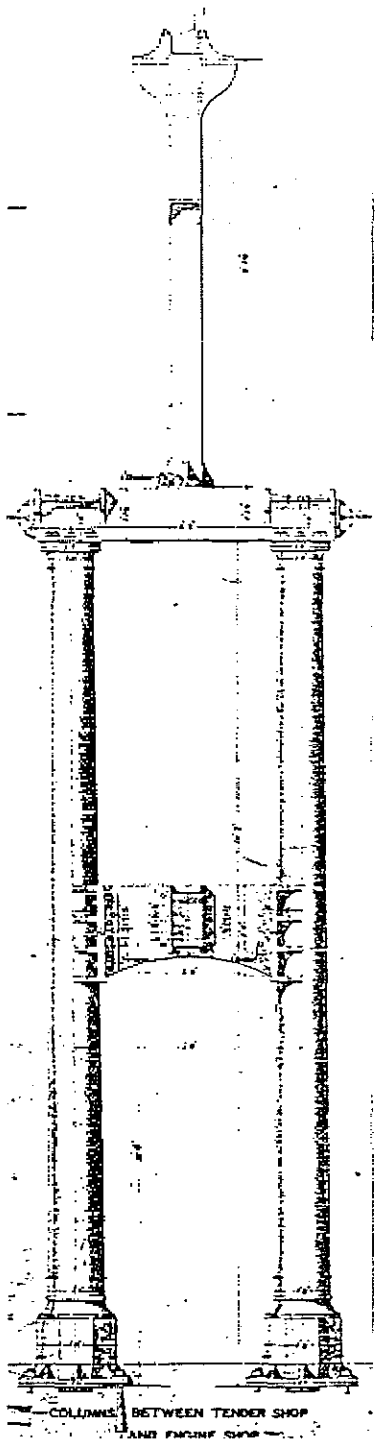


Illustration 2.1: Elevation of double columns. SRAO EL W19

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 across each bay (1, 2, 3, 4, 4a, 9, 10, 11). Bays 7 & 13 had a traverser which served 15 sets of dead end rails in each of 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, 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 and possibly elsewhere. It can be expected that remains of these engines and the line shafting associated will be found in these areas.

This configuration has changed many times and the associated machinery moved, so Bays 6-13 are open spaces. Bay 1 North was altered to accommodate the Davy Press, Bays 1 South, 2 & 3 still contain forges etc lined up across the building with the centre road free. Equipment moved from other bays is stored in Bays 1 & 4 and these areas are fenced off.

Bay 4a S is empty and 4aN is fenced off as an historic materials store. Bay 5S has the mezzanine built for the army in World War 2 (later the canteen) and the more recent mezzanine is over Bays 5 & 6N. Bay 14 & 15 are enclosed by brick walls and Bay 15S has an older mezzanine with office subdivisions. Bay 15N is open except for some recent small enclosures.

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 4a North.

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

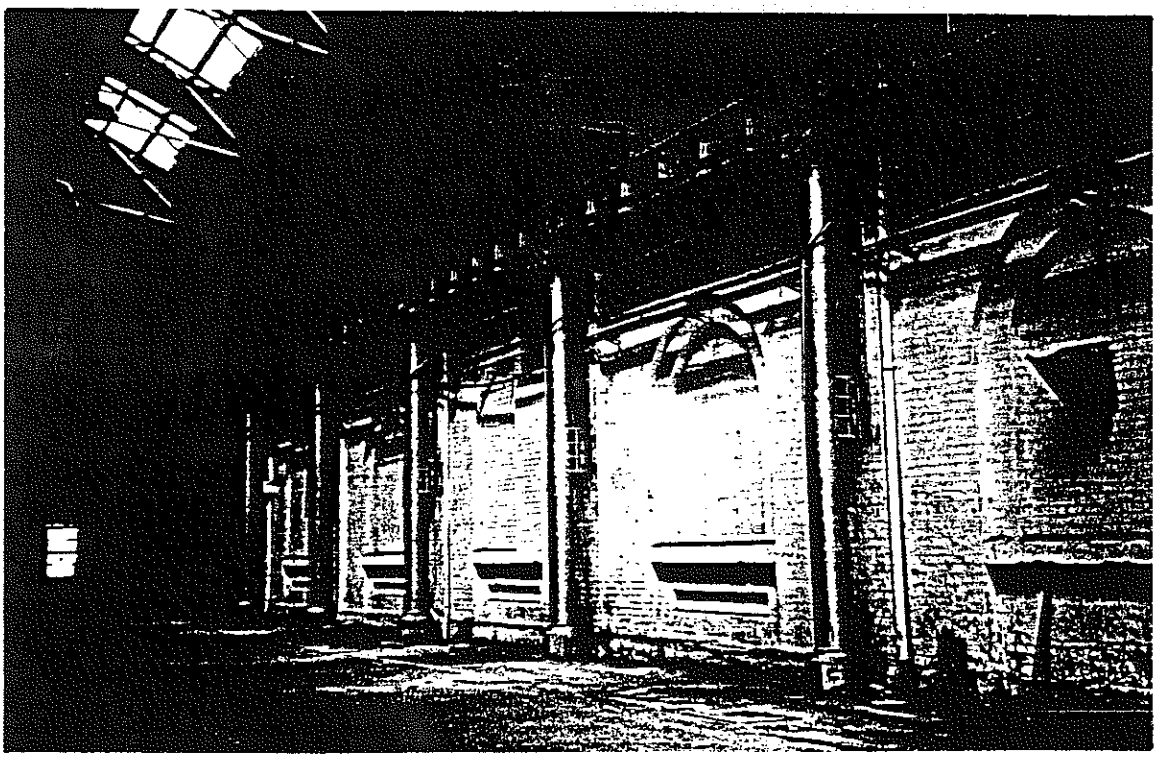


Illustration 2.2: Bay 4a, west wall looking south. Photo Jean Rice 1995.

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. The brickwork is modulated into bays forming piers which 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. It is not known how the walls are 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 which allow very tight mortar joints.

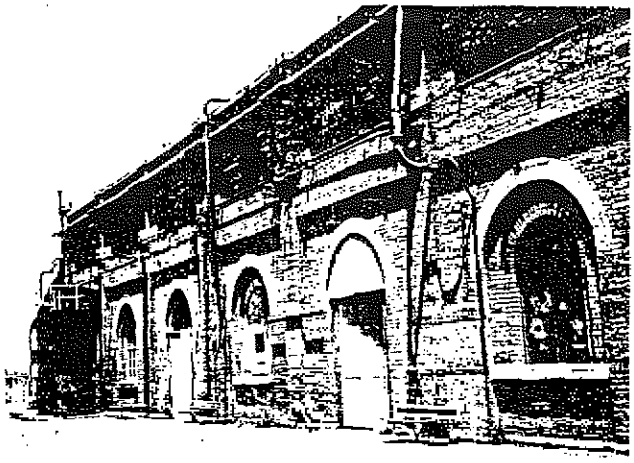


Illustration 2.3: East wall. Photo Jean Rice, 1995.

The condition of the brickwork is generally excellent though it is dirty and the polychrome work obscured in many areas. The eastern wall has been aggressively cleaned seriously damaging the bricks by removing their hard face and exposing the soft interior. This is difficult to repair and may be best left, further consideration is needed. 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 details brickwork cracking in the south and north east corners and in the east wall where downpipes are embedded in the wall. These areas are also subject to lateral damp evidenced by the symmetrical patterns of salt deposits at the downpipes. In some areas there is also associated plant and mould growth. Once the downpipes are operational this brickwork should be allowed to dry out, the plants killed with a biocide and some desalination work on the brickwork may be required.

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. Some recent crudely formed additional openings have been made and some early carefully made examples e.g Bay 4 high level. The walls of Bay 4a have dry pressed bricks as they were constructed at a slightly later date.

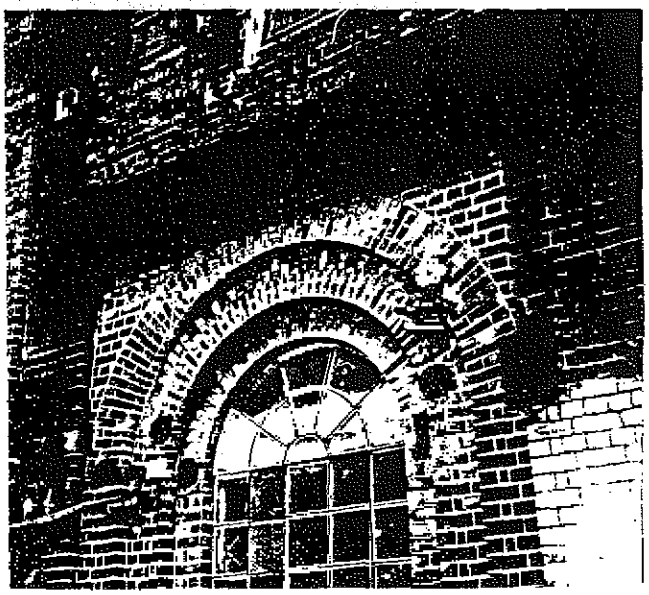


Illustration 2. 4: Detail, south wall Bay 13. Photo Jean Rice, 1995.

- 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. On the pediimented areas, roof flashings are recessed in a trench in the stone. The stone cornice is badly deteriorated in some sections and should be assessed by a stone mason to determine what repairs are necessary. Some replacement may be required but patching and/or other methods to restore the function (i.e helping the building shed water) and appearance may be appropriate. The splayed coping gives the appearance that the parapet stones are unstable. Some are e.g at the North and South-East corners where stones are cracked, but many others are not.

The copings & cornices should be checked by a mason from a cherrypicker. The sills are physically damaged in areas but are mostly structurally sound Stones which are unstable should be removed by a mason and relaid or replaced with minimal delay. 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 epoxy patched.

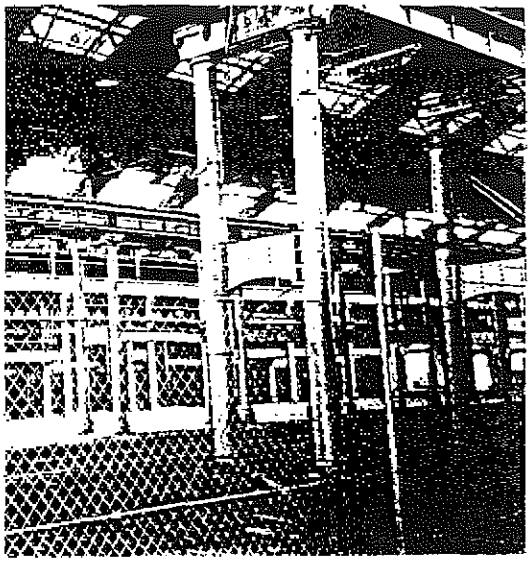


Illustration 2. 5: Column grid, Bay 6 looking north-west. Photo Jean Rice, 1995.

- 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. The drawings show no piles in 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. There is some evidence of minor settling of the piles, (see section 4.3 structural assessment). This should be monitored in particular as it affects the gutters and crane rails. See sections 4.4 and 4.5 for further comment.

- 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 ½ and 2/3. The layout was changed several times early in the buildings 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.

- 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 4a as these were installed at a later date. At the north end of Bays 3, 4 and 4a are elevated sections of roof which are highly distinctive features in views of the place. Their function is not clear but are presumed to be related to boilermaking.

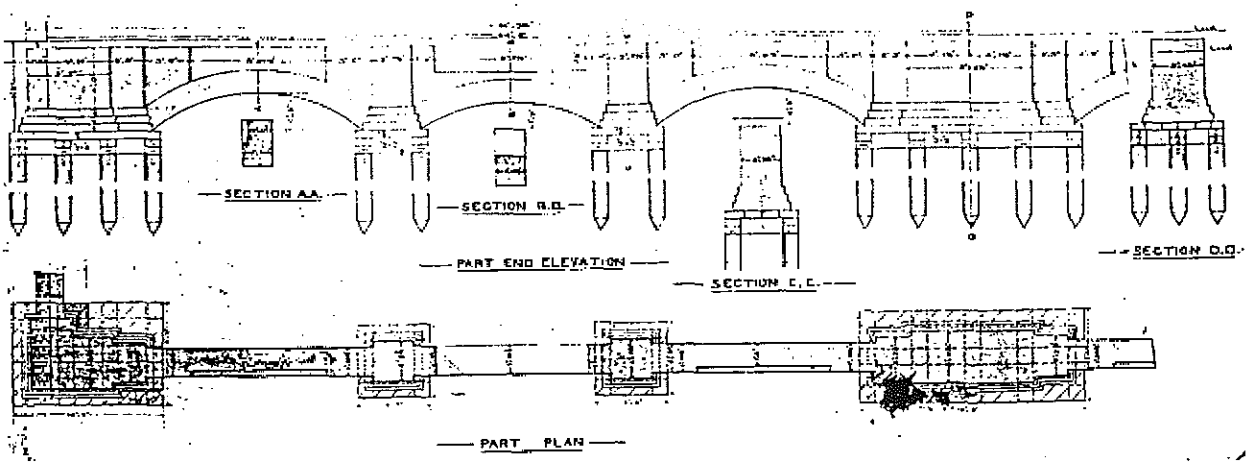


Illustration 2.6: Foundations, part plan and elevation. SRAO ELW 2.

- Roofing

The roofs are clad in "corrugated iron" most of which is no more than 20 years old. There are some areas which appear to have original 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 makers name, some early iron is stamped NSWGR. Any surviving early iron should be conserved. Much of the recent roofing is in good condition but some areas of roof need replacement or repair. They have not been surveyed in full. The original roofs had extensive areas of glazing below the monitor roofs. The configuration of this glazing remains only in Bay 15 West. The remainder of the building has sections of translucent corrugated fibreglass. Parapet flashings and roof/monitor junctions are haphazard and many need replacing. The monitor roofs have heavy gauge iron louvred sides in good condition and some of the original detailing at the ends remain and should be conserved. None of the original monitor guttering, (shown on the drawings) is known to have survived (or it may not ever have been built).

- Gutters and Downpipes

The stormwater drains into box gutters running the length of each bay. The gutters are purpose designed cast iron sections - each 10 feet long, falling to the specially designed column head and interlocking with the adjacent gutter. These gutters are visible from inside supported on top of the lattice girders. They have not been generally inspected and should be as part of a detailed building fabric survey. Examination of some visible points using binoculars indicated one broken section and corrosion at the junction with the column. To fully assess condition and to devise repair methods, a section needs to be removed. At the brick walls the gutters discharge into specially designed cast iron boxes which are built into the brickwork, thence into downpipes within the brickwork. The columns, trusses and roof drainage elements are a remarkably integrated and carefully designed system. Repair methods need to be investigated to avoid destroying the integrity of the structure and system.

Illustration 2.7: South Wall. Photo Jean Rice, 1995

- Other

Windows and doors are described in following sections and are consistent with the building type. Openings to the traverser 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. Currently these openings are enclosed by poor quality later construction.

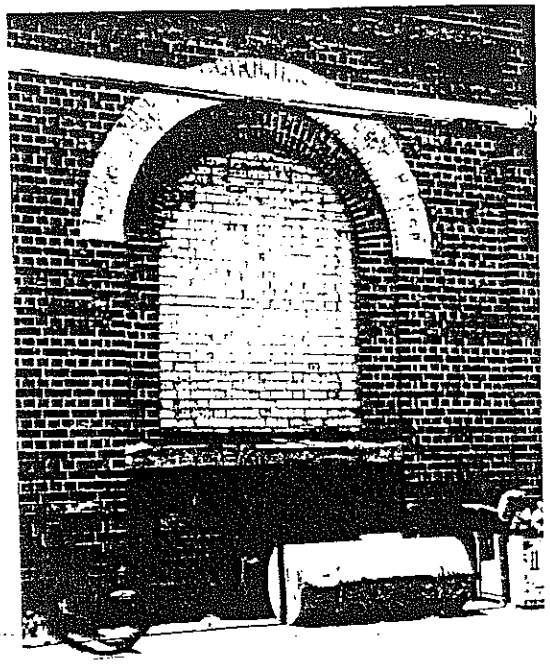


Illustration 2.8: Typical blank arch. Photo Jean Rice, 1995.

Modifications to the construction of the main block include the Bay 5 and 15 south mezzanines - both of some significance and detracting little from overall significance. The lift motor room protruding from the Bay 15 roof detracts from the aesthetic value. The mezzanine in Bays 5 & 6 north has no significance itself. It is not highly intrusive but detracts from the appearance by obscuring the bay structure and because of the crude external opening in the north wall.

The original construction of the floor is not known. There where extensive sets of rails and pits (Bays 5, 6 8 & 12) which are now covered with bitumen or concrete. 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 of these are part of the original construction (2, 4, 6, 12, 13), some are early construction of value (1, part 7, 19, 21) and the remainder are later structures mostly toilets and awnings which may be used or removed. Some are very intrusive (11) and should be 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, all underground (shown on the plan of the chimney). The underground flues probably still exist. Similar annex structures were originally in Bay 4a before it was roofed in. Sub-surface remains may exist especially of the core store which had an underground space.

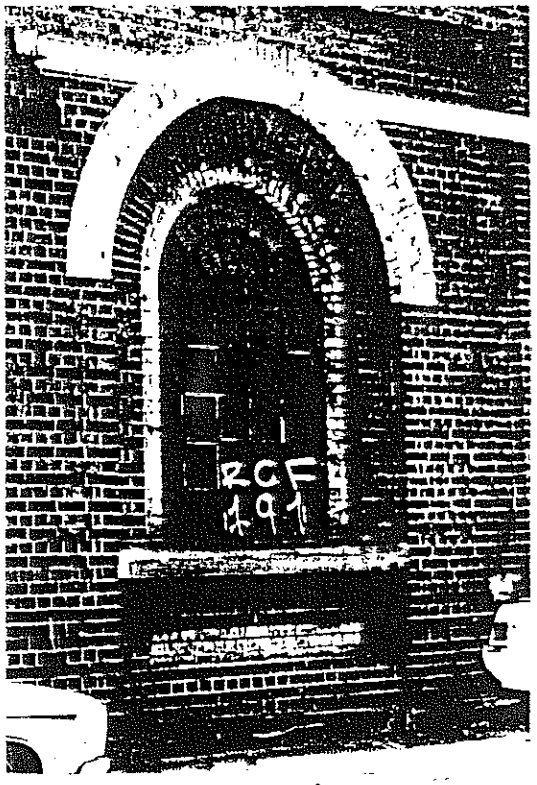


Illustration 2. 9: Typical window. Photo Jean Rice, 1995

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.

Annex 8: Skillion over entry to Bay 4a.

Annexes 9-11: Modern toilet blocks and shelters.

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.

Annex 19: CGI fuel store with sand floor.

Annex 20: Modern toilet block.

Annex 21: Remains of early toilet facilities at first floor level.

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ops No 4 Annexes

Details of Chimney

Drawing No. 5.

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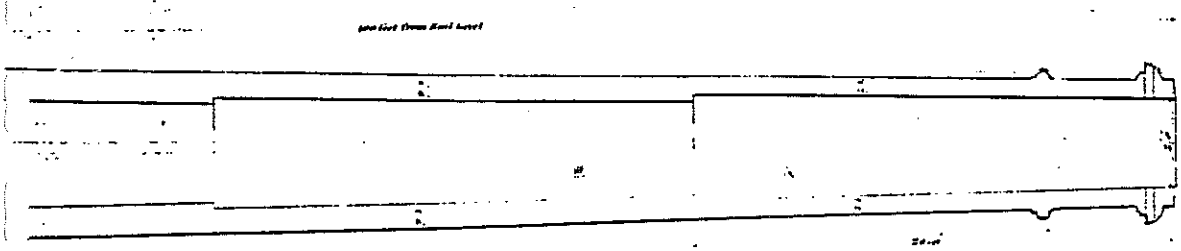
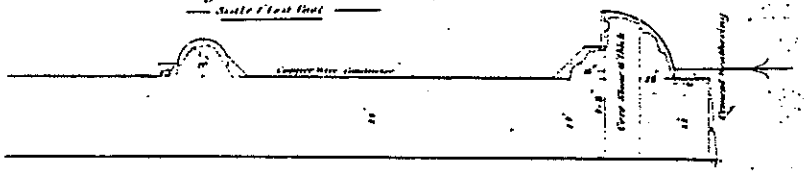
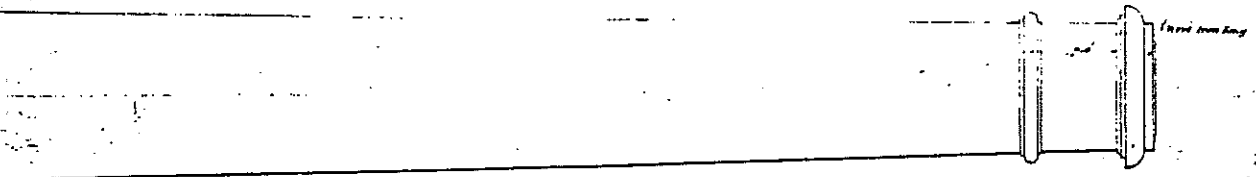


Enlarged Detail of Chimney Tip

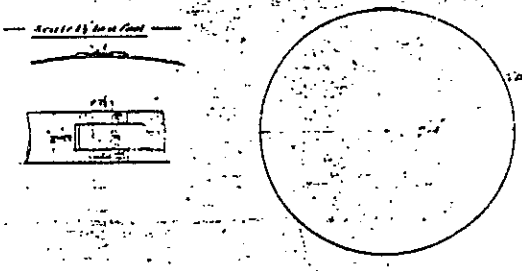
Scale 1 foot to 1 foot





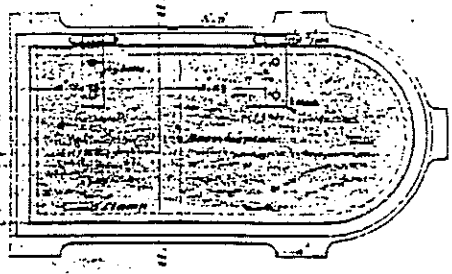
Detail of Ring

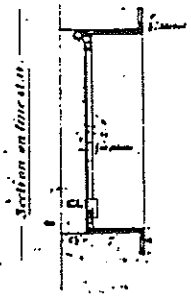
Scale 3 inches to a foot

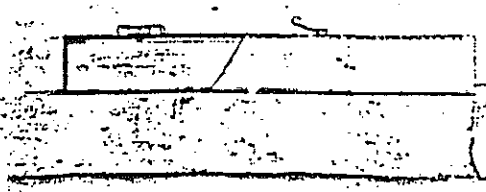


Detail of Base

Scale 1 inch to a foot







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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. Presently many are visible or exist under the bitumen.

The tracks are shown on various plans. Of great importance is the traverser 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 are two sets of tracks and several associated turntables which demonstrate how items were moved from bay to bay and to buildings such as the wheel press shop. (See later sections on machinery.)

To the east the space between the Loco Shop and the new Loco Shed was formerly the site of the *extended steam hammer shop* and *spring shop*. There are likely to be sub-surface remains including possibly steam or compressed air services. There is a track parallel to the building, sections of which are now exposed which linked to turntables at each end. This area has a history of industrial use and this should be interpreted in relation to the Loco Shop and to the rest of the site.

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

Finishes

The finishes of various surfaces have not been assessed in detail. In the future they should be sampled and analysed to determine the nature and colour of original 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

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. The findings are preliminary. Further close examination is considered necessary in certain areas to confirm some of these findings and to recommend appropriate repairs.

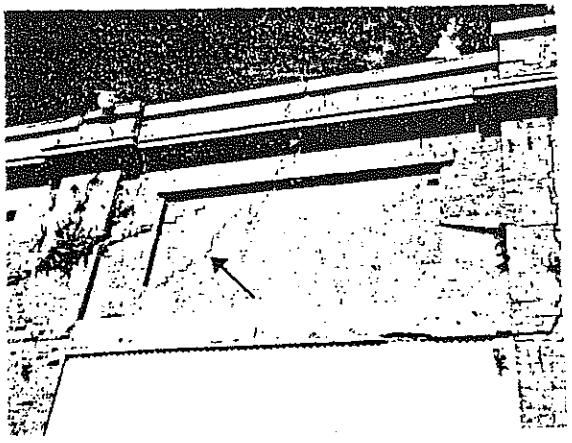


Illustration 2. 10: N-E corner, Bay 1.

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 (Bay 4A, 5 to 15) appear to be supported on high level footings. Recent geotechnical information (References 5.1, 5.2) show that 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 appears to be confined to Bays 1 to 4 and the attached brick rooms along the south facade, and is manifested mainly as brickwork cracking. Cracking of brickwork is most severe in the north-east and south-east corners of Bay 1. Bays 4A to 15 appear to have suffered no structural damage other than some light rusting of the roof purlins.

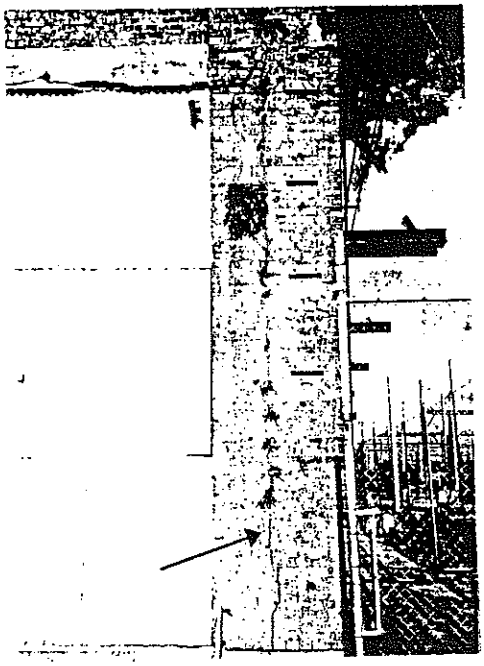


Illustration 2.11: N-E corner, Bay 1.

3. Illustration 2.10 and 2.11 show cracking of brickwork in the north-east corner of Bay 1. The vertical crack in the engaged pier tapers from about 10 - 15mm at the top to fine at ground level. The brickwork from above the door head leans outwards to the north. The vertical cracking was reported by McBean and Crisp Pty Limited (8.1.1986) and does not appear to have worsened since then.

   This cracking and lean could have been caused by settlement of the footing and/or the dynamic effect/impact of the gantry crane. Corrosion of any embedded ferrous metals would have contributed to the cracking.

   Illustration 2.10 also shows that the brick pier has cracked and bulged (easterly) outwards at the door lintel. Illustration 2.12 shows the lintel is a steel beam encased in concrete. Part of the encasement to the beam soffit has spalled away due to corrosion of the beam.

Illustration 2. 12: N-E corner internal view, Bay 1.

The expansion product of the corrosion has cracked and bulged out the brick wall at the beam support. This cracking was not reported by McBean and Crisp.

4. The south-east corner of Bay 1 shows cracking (Illstration 2.13 and 2.14) similar to the north-east corner but there is no lean. In addition the south face of the pier also shows cracking at the top (Illustration 2.15).

5. There is vertical cracking in most of the intermediate engaged piers along the east wall in Bay 1 (e.g. Illustration 2.10 and 2.18). Illstration 2.19 shows cracking of the pier in Illustration 2.10 extends to the inside. The cracking commences below the stone cornice where the embedded stormwater downpipes start. This suggests that corrosion of the pipes has caused the cracking. Corrosion of embedded fixings of columns to the piers might also have contributed to the cracking.

6 There is localised cracking adjacent to wall openings (e.g. Illustration 2.16 and 2.20 north wall) which might be due to settlement. Illustration 2.21 shows cracking which might be an expansion crack as the building does not have any expansion joints.

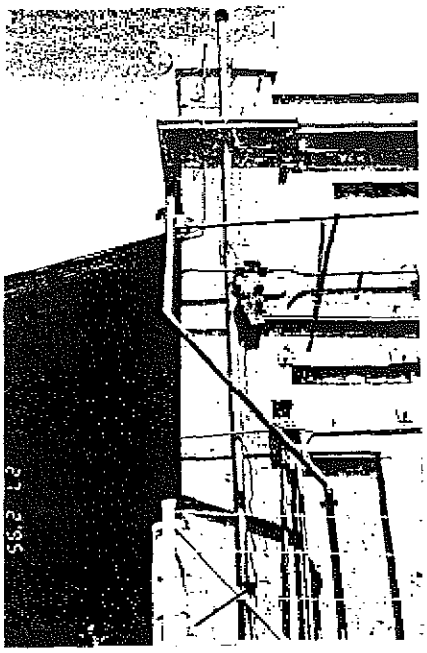


Illustration 2. 13: S-E corner, Bay 1.

7. Illustration 2.17 and 2.22 shows cracking in 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.

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 (e.g. Illustration 2.23 in Bay 2).

   This splitting and tilting has probably been caused by corrosion of the cast iron purlins embedded in the gable copings. The corrosion products have probably lifted the upper courses. 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.

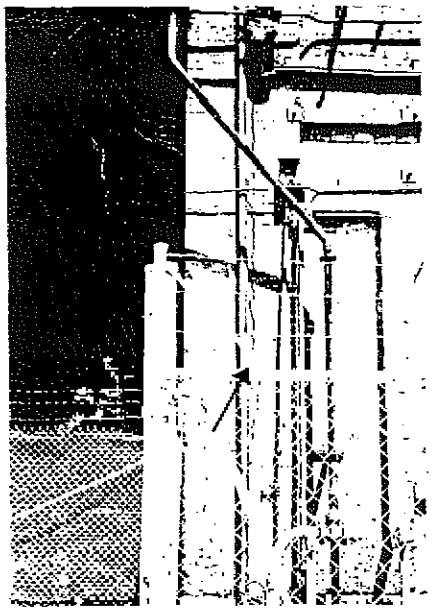


Illustration 2. 14: S-E corner, Bay 1.

9. Cracking is also evident in the brickwork in rooms attached to the south facade in Bays 1 to 4 (e.g. Illustration 2.24).

10. Two internal columns between Bays 1 and 2 appear to have settled as indicated by the dip of the supported roof trusses (e.g. Illustration 2.25 at Row 2). 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 (e.g. Illustration 2.26 in Bay 1) whilst the roof trusses are generally in good condition. The photo also shows the timber purlins added later.

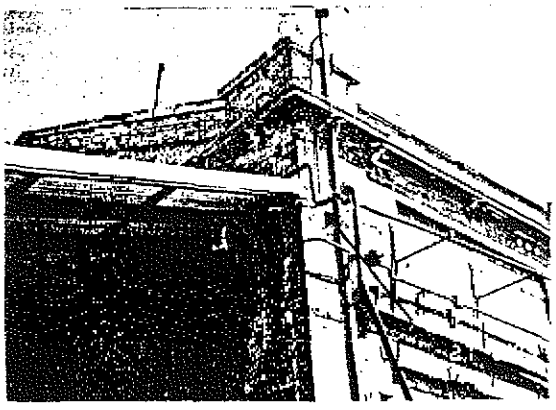


Illustration 2.15: S-E corner, Bay 1.

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. However, the stability of the brickwork in the present condition in the north-east and south-east corners of Bay 1 and the southern end gables in Bays 1 to 4 may be in doubt in the longer term.

4. It is considered that the north-east and south-east corners of Bay 1 and the coping courses of the southern end gables in Bays 1 to 4 in their present condition are at risk in an earthquake and may collapse.

5 The adequacy of the rest of the building to resist horizontal earthquake forces has not been assessed.

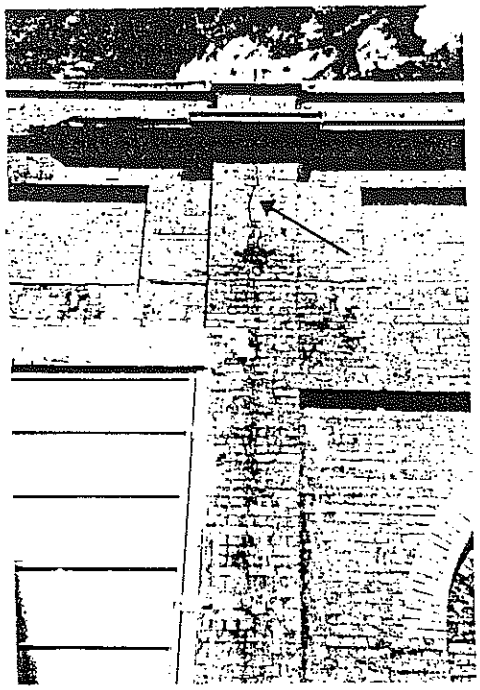


Illustration 2.18: East Wall Bays 13/14.

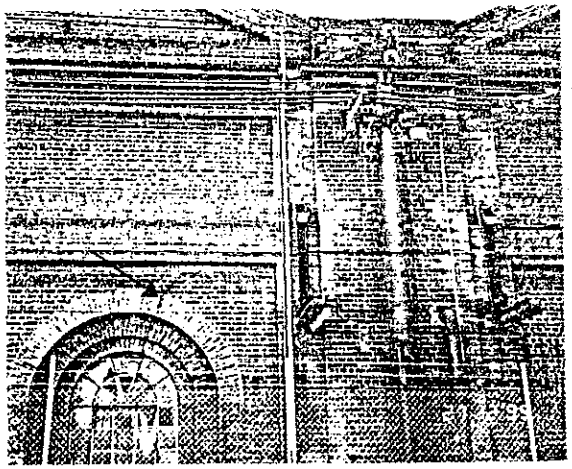


Illustration 2.16: North Wall, Bay 1.

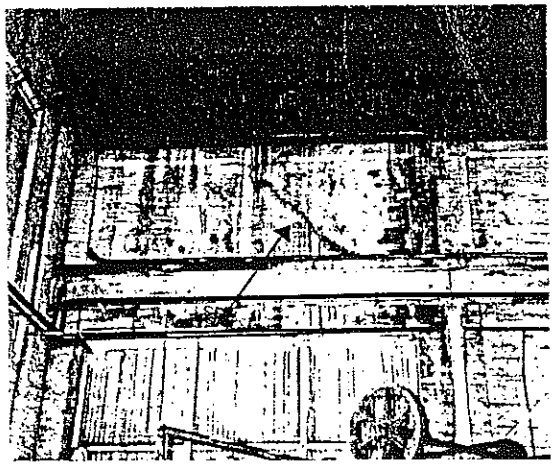


Illustration 2. 19: Interior of Bay 1, N-E corner. Note cracking brickwork.

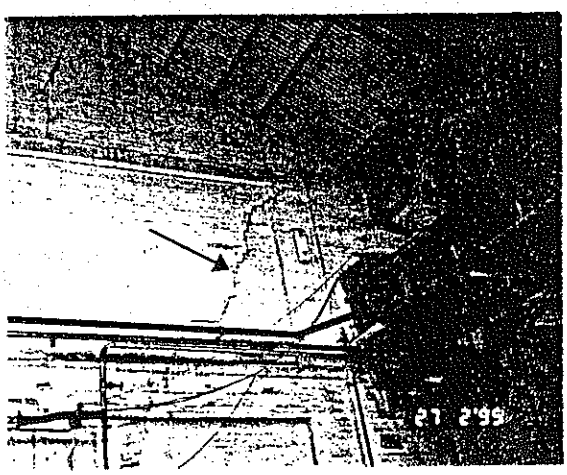


Illustration 2. 17: South wall, Bay 3.

Illustration 2.20: North wall, Bay 1 or 2.

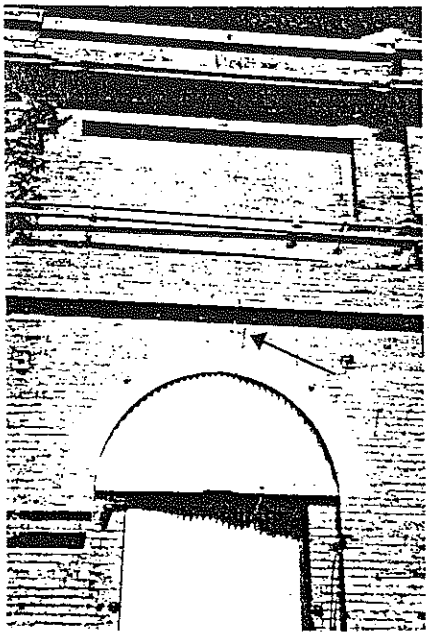


Illustration 2. 21: East wall, Bay 1

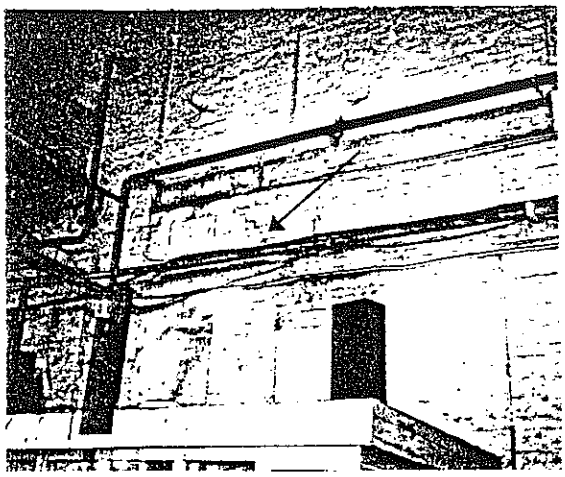


Illustration 2.22: South wall, Bay 3

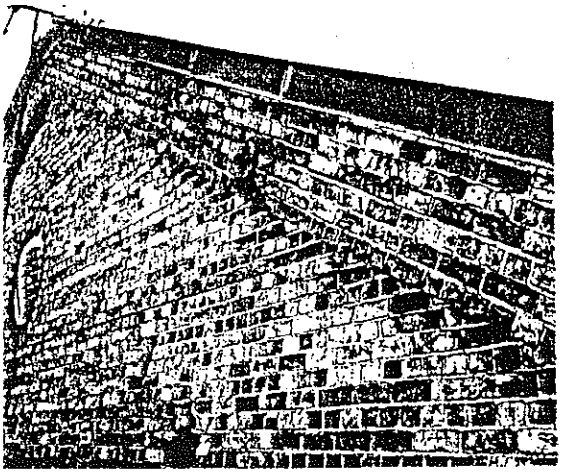


Illustration 2.23: South gable wall, Bay 2.

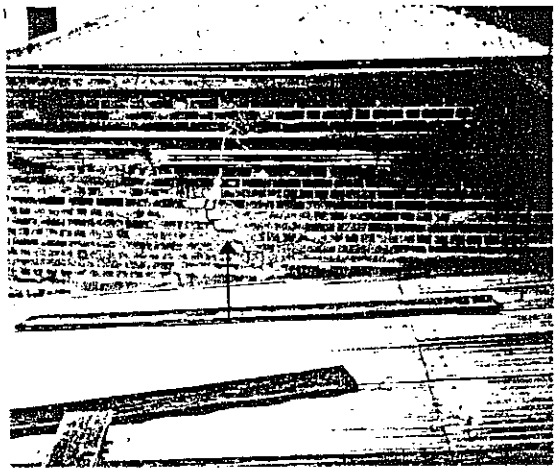


Illustration 2.24: East wall of annex no. 4.

Illustration 2.25: Column, Bay ½, Row 2.

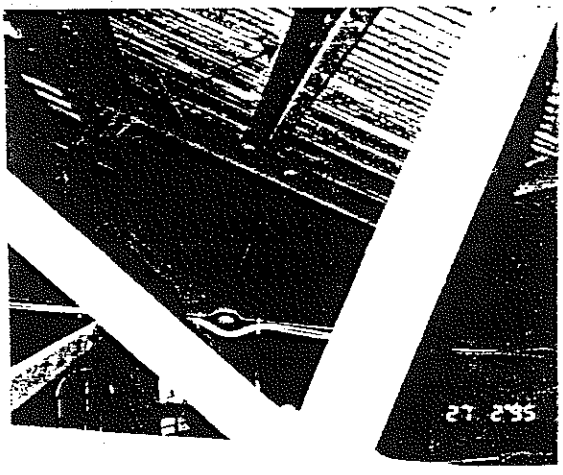


Illustration 2.26: Roof, Bay 1.

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.

3. If the embedded downpipes are to be renewed within the engaged piers, it may be necessary to remove some bricks to check on the construction and confirm the cause of cracking of the brickwork. In the re-construction the replacement downpipe should be surrounded with mortar to provide an alkaline protective environment against corrosion.

   If it is intended to connect the roof stormwater to downpipes external to the piers, it is not necessary to remove the existing downpipes provided ingress of water to the piers is prevented.

4. A closer examination of the southern end gables in Bays 1 to 4 should be carried out to confirm that the cracking has been caused by corrosion of the embedded cast iron roof purlins. Appropriate remedial work can then be determined.

5. Flashing to roofs which were previously attached to the east wall in Bay 1 should be removed and the brickwork made good, as the flashing reduces the strength of the brickwork.

6. 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.

   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 reduces 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.

   Legal requirements appear to be uncertain. However, owners of existing buildings who have prior knowledge of the potential risk to damage of property and personal injury that may be caused in an earthquake and choose to ignore such risk may be subject to tortious liability.

   The Occupational Health and Safety Act may have relevance.

   It is now common practise 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, foe 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.

4.4 BUILDING EXTERIOR

This section describes sections of the building complex in detail. Due to the constraints in time, inventory sheets were prepared on typical sections of the building. It is recommended that eventually the whole complex be examined and inventory sheets completed for every bay.

Roof System

Due to PWD safety instructions operating at the time, only limited access was available to the roof system to Bay 1 and 2. It is evident, however, that sections of the roof system are original and therefore are highly significant. These elements were as follows: cast iron gutters, 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 is the roof lantern's end wall sheeting and detailing to Bay 2, with what appears to be early wrought iron corrugated iron together with parts of the original timber architrave trim work. This is shown on the original drawings opposite.

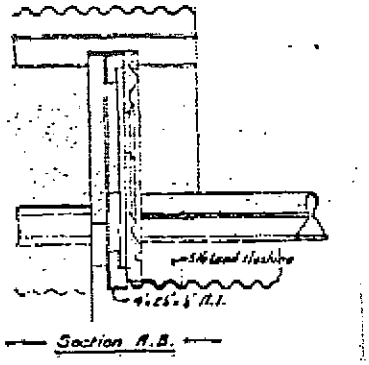


Illustration 2.27: Roof section. SRAO ELW5.

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.

Though roof leaks are evident in parts of the complex, it is an outstanding system which has survived over a hundred years, and future research is recommended to ensure the system is carefully repaired so it will continue to operate satisfactorily. It is recommended that the whole gutter, downpipe, underground stormwater system be carefully analysed, together with relevant conservation consultants and together with assistance from the Heritage Council's Technical & Advisory Group on Materials Conservation (TAGMAC). The Consultant Group should include an industrial archaeologist, conservation architect and metallurgist.

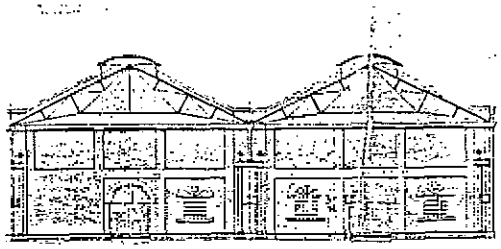


Illustration 2.28: Section, SRAO ELW3.

Refer to Section 4.5 Building Interior's Roof Truss for further information re roof system.

East Wall

The east Wall has been surveyed in detail in the inventory. The results and recommendations are summarised here. The facade is largely intact, considering the great number of changes that have occurred at this part of the site.

The main conservation issues are as follows:

(i) North and South ends that require considerable stabilisation works - these are outlined in the above 4.3 Structural Assessment section.

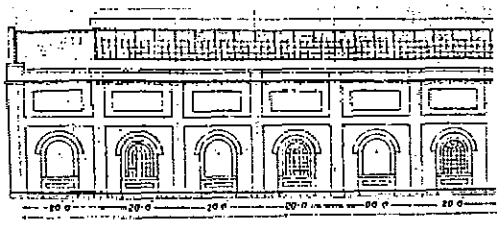


Illustration 2.29: Side elevation. SRAO ELW3.

(ii) Window recesses: these were originally a series of cast iron windows with intermediate "blind" windows. The recent aluminium window and door installation is intrusive and detracts from the heritage significance. The inventory sheets give a series of recommendations with several options, either reinstatement of the cast iron windows or leaving some openings as doors. The final discussion will likely be based on conservation and client's future use considerations.

(iii) Main central door: 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 have been replaced with intrusive metal doors.

(iv) Hydraulic lines and flues which service the working machinery in Bay 1 are mounted on the surface of the wall. Though some parts are understood, the function of other lines is not known.

(v) Brickwork: the repair of the facade, especially around and within the window recesses, will require the remaking of suitable brickwork. A suitable brickyard will need to be sought which will be capable of reproducing both the colour and the required shaping of the splayed brickwork of the window and door arches. Similarly, extreme care will be required with the re-pointing of the brickwork and it is recommended that a test sample be prepared (not on this facade). There are only a couple of bricklayers known to be capable of doing this type of work to the required conservation standards. An opportunity exists at Eveleigh to encourage skilled tradesmen to train younger apprentices for the future maintenance of both Eveleigh and other significant precincts.

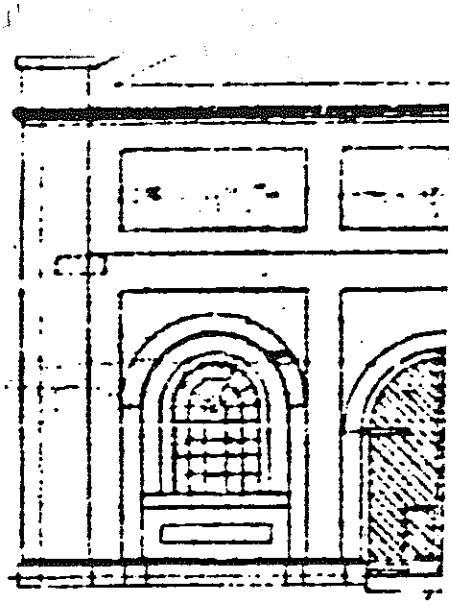


Illustration 2.30: Elevation detail, SRAO ELW18.

(vi) Other elements: refer to the inventory sheets.

West Wall

Due to budgetary and time considerations, this section was not examined in detail in the inventory. Further site surveying and assessment will be required prior to documentation of any works. Some key observations are as follows:

- The general condition of this facade is generally very good and general maintenance only will be required.
- The facade is largely original and it is considered to be highly significant and no alteration should be made to it.
- The highlight windows, which were inserted to the mezzanine area of Bay 15, should be preserved, as well as the large metal brackets of the former monorail, as both are important for the historical interpretation of the complex.

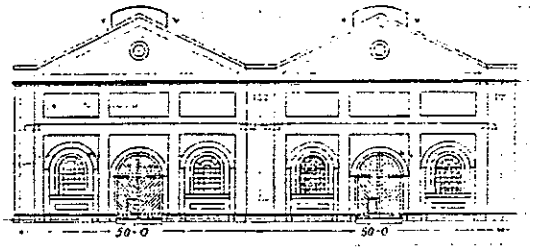


Illustration 2.31: Elevation, SRAO ELW3.

4.5 BUILDING INTERIOR

The first four bays of the interior were surveyed in detail. The following drawings describe and name the various elements of the structure.

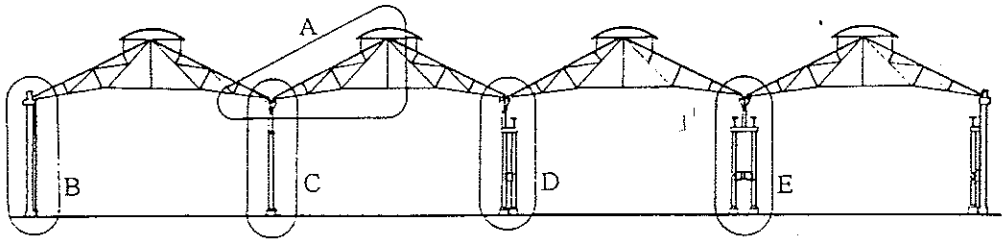


Illustration 2.32: Sectional elevation Bays 1-4.

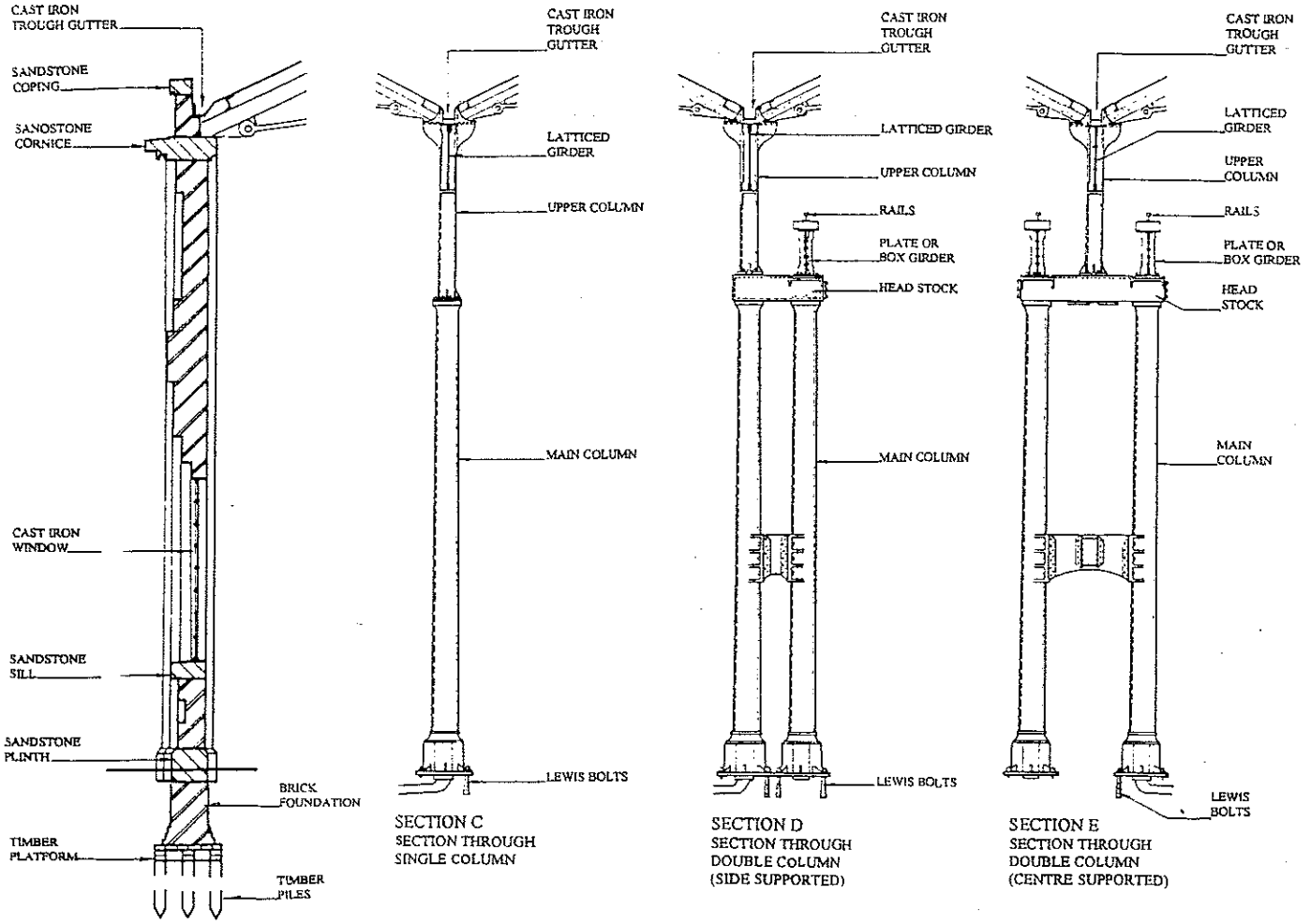


Illustration 2.33: Sections through wall and columns.

North Wall

Bay 1 has been included in the Inventory Survey, while the rest of this facade will require further site surveying and assessment prior to documentation of any works.

General observations are as follows:

- The facade is generally in reasonable condition and largely conforms with the original plans. Again, it is highly significant.
- The large metal brackets of the former monorail should be preserved as for the west wall.

Refer to Section 4.3 re Structural Assessment of East corner of Bay 1.

South Wall

This wall will require further investigation, together with the Annexes.

The main conservation issues on this wall are as follows:

- The cracking of the roof pediment 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.
- The annexes are referred to in the inventory sheets. There are only broad guidelines and further research will be required prior to any demolition works are contemplated.

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 mobility, 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:

> *"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).

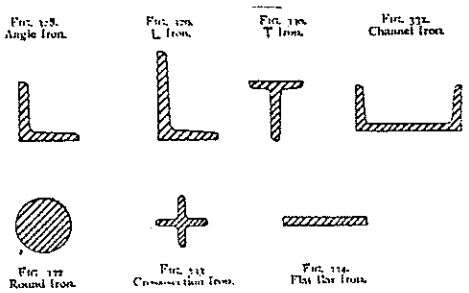


Illustration 2.34: Wrought iron shapes.

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).

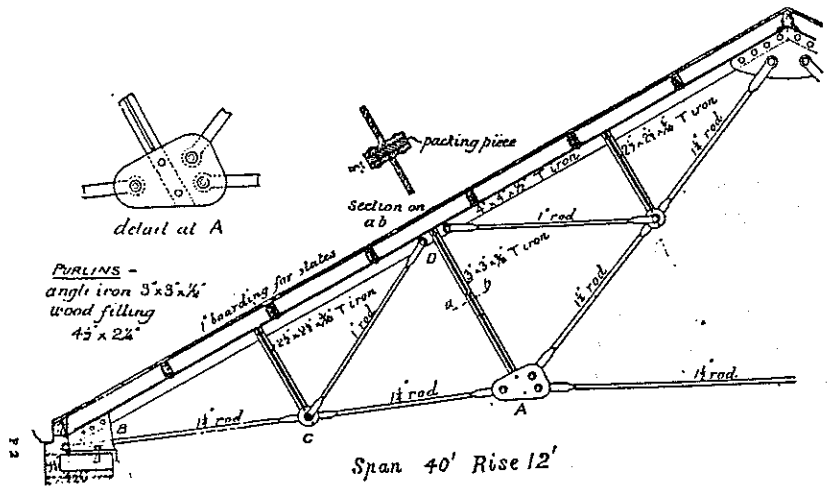


Illustration 2.35: Text book truss.

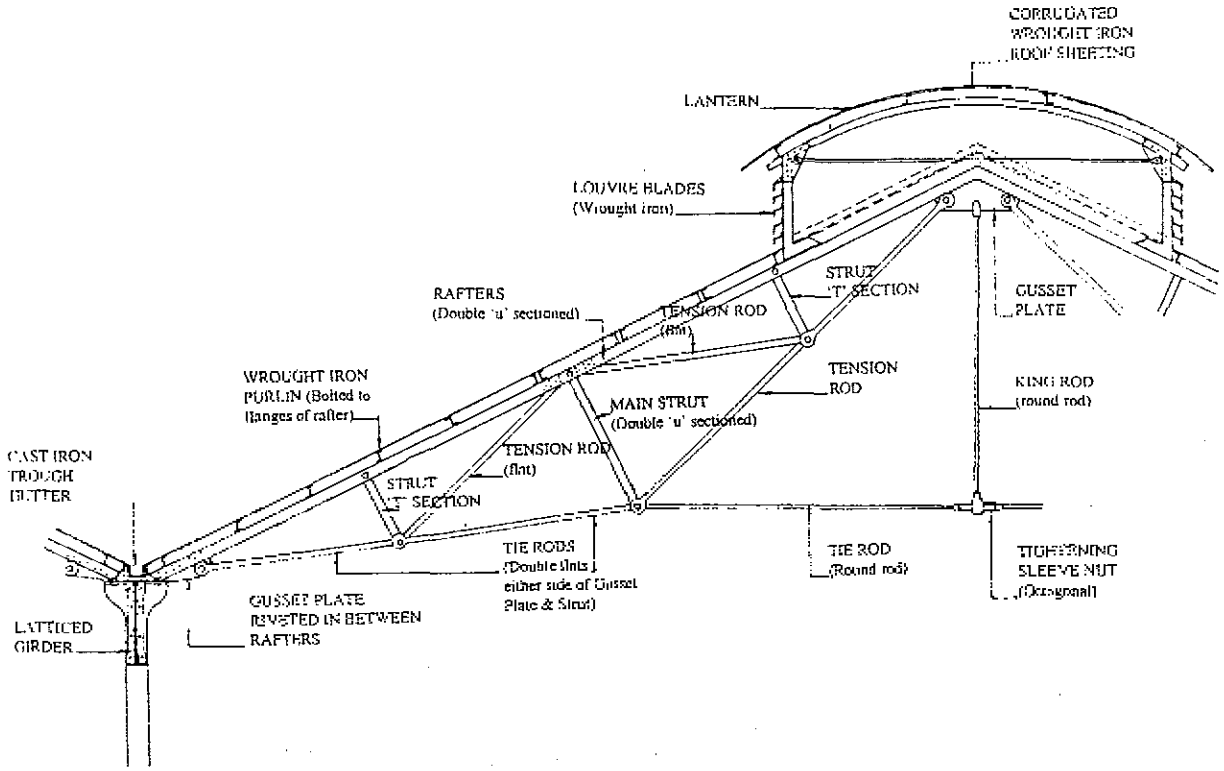


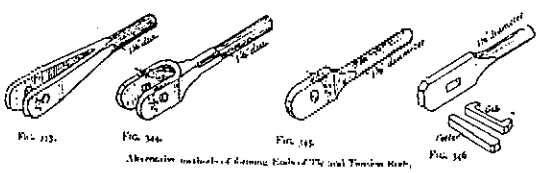
Illustration 2. 36: Part elevation of principle truss, Bays 1-4.

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.

Illustration 2.37: Tie rods.



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.

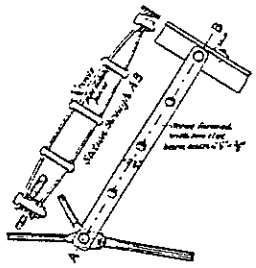


Illustration 2. 38: Text book strut system.

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

It is recommended that the truss system and the External Roof system be further investigated, as discussed in Section 4.4 above.

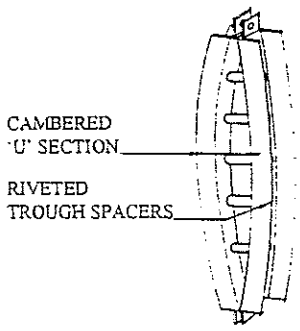


Illustration 2.39: Eveleigh Strut system 1884.

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 building 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 requirements 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 overhead rail girders. The sophistication of this is apparent at Eveleigh, as shown below, 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.

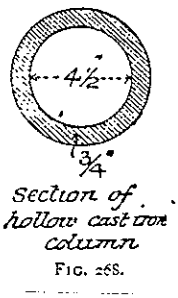


Illustration 2.40: Text book section of hollow cast iron column.

In between the cast iron 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 use of columns in the future alteration works.

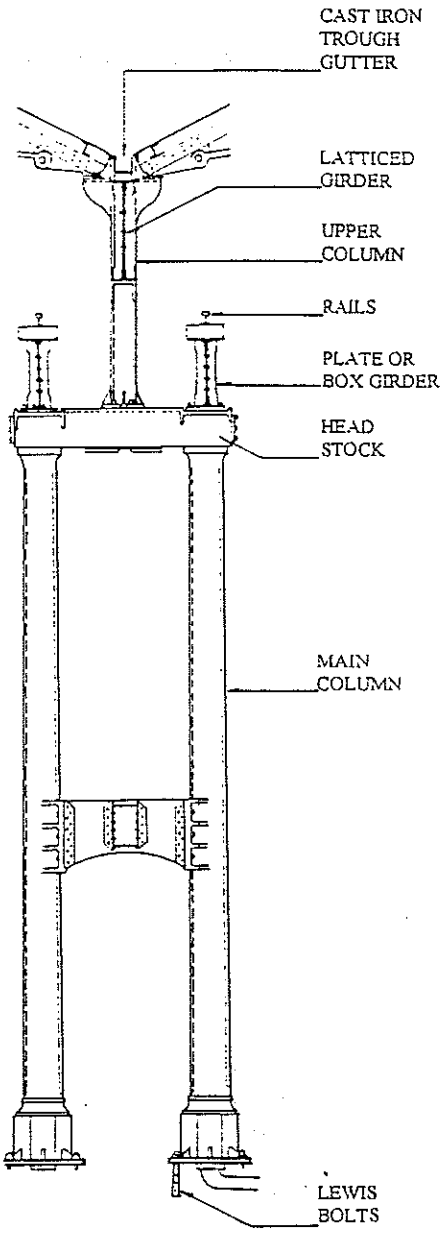


Illustration 2. 41: Section through double column (centre supported).

Internal Walls

There are few internal walls. That between Bays 4a & 5 was originally an external wall and those between 13 & 14, 14 & 15 are original internal walls. Spaces are subdivided generally by the column grid. Modern intrusive steel fencing subdivides off the central corridor in bays 1-4.

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.

Due to some settlement of the north and south ends of the Eastern Wall (Bay 1) and also due to some settlement of several of the cast iron internal columns, it is recommended that one section of the underground piling system be uncovered to determine the condition of this area. This would allow a much more considered opinion of the whole Eveleigh system. This process is seen as a continuation of the current Conservation Plan and must include an industrial archaeologist, structural engineer and conservation architect.

The condition of the walls is generally good, other than the external east wall and upper sections of the south wall (pedimented sections). The finishes on the internal walls will also require further research, including testing by a building scientist. Due to the contamination of the walls by ground salts, air borne pollutants as well as various chemical/solutions from the long industrial processes at Eveleigh, these will need to be well understood before any resurfacing of the brick and stone work can be contemplated.

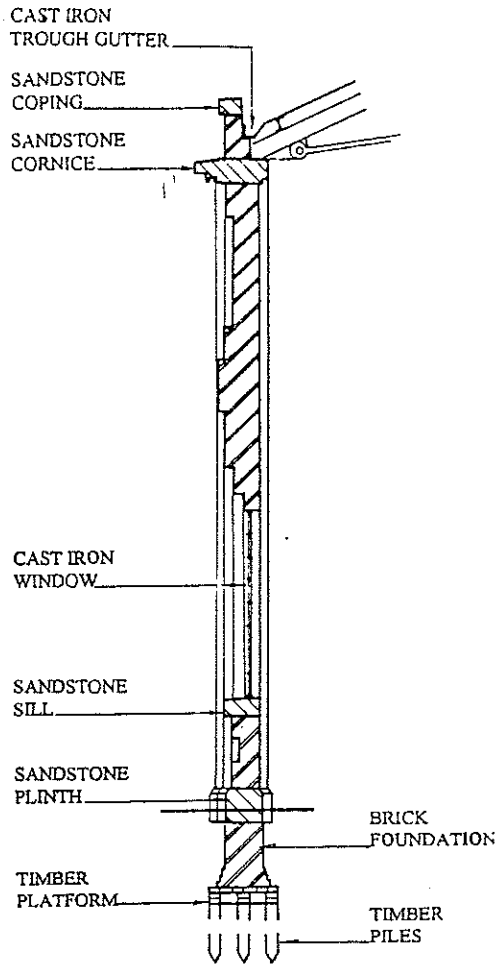


Illustration 2. 42: Section through masonry perimeter wall, Bays 1-4.

Windows

The original windows at Eveleigh are of cast iron, with curved heads and multi-paned, as shown opposite. The centre section, consisting of nine panes, was openable, operating from a central pivot hinge. The castings incorporated traditional 'astragal' cross sections, which follows from earlier timber traditions.

The current study has not had the ambit to inspect all the windows. However, a pro forma sheet is shown as part of the inventory sheets, that should be used in the survey of every window in the complex.

The existing surviving cast iron windows are regarded as of 'High Significance'.

Further research is required in reference to the corrosion of window lugs set into the brickwork and also regarding the original finishes to the windows.

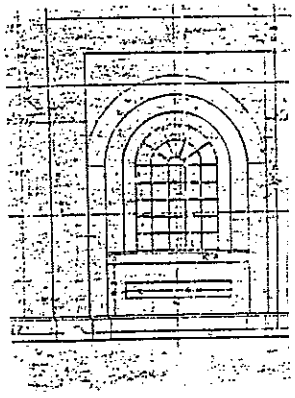


Illustration 2. 43: Eveleigh cast iron window, 1884. SRAO ELW3.

Doors

The main doors at Eveleigh are typical of the period, being ledged and braced timber doors, as shown on drawings opposite. 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. There is physical damage to most timbers but many are structurally sound. There is evidence of termite damage to timber jambs in some locations.

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.

A sufficient number of the original doors survive, together with several of the salvaged and stored doors, to allow for a conservation programme to be undertaken. The existing surviving doors are regarded as of 'High Significance' and each one should be carefully examined on the basis of the pro forma incorporated in the inventory sheets.

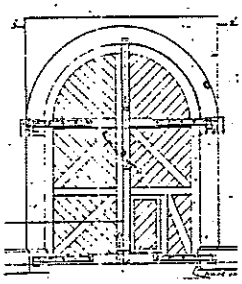


Illustration 2.44: Eveleigh Locomotive Workshops' main doors. SRAO ELW17.

Other Items and Features

Further research will be required re the incidental items. These will include items like the smaller single leafed ledged and sheeted doors shown on the original drawings.

Other items noted are fascias, barges, architrave trim at the end of roof lanterns. Social history items such as significant graffiti, etc. should also be considered. These items are of considerable importance, as past projects have often, in the initial rushes of the 'tidy up processes', removed valuable smaller joinery items.

Floors and Sub-Floor Spaces

The existing floors at Eveleigh include a range of industrial finishes, from concrete and bitumen to bare earth and contribute to the character of the place. The current floor finishes are often over earlier finishes, concealing a range of old rail lines, sumps, pits and drains. Care should be exercised in dealing with these so that the full historical interpretation of Eveleigh is not lost. Refer to the archaeological section re further comments.

The buildings 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 undergroung drainage system are not known.

4.6 THE MACHINERY

4.6.1 In Situ Plant and Machinery within the Workshops

The machinery and equipment in Bays 1-4A of the Locomotive Workshops consists 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 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. Another report is to be prepared which will address the conservation management of all relocated and introduced items of machinery and plant. Though not called for in the brief some moveable items are considered in this report where they are an integral part of assemblages related to large items.

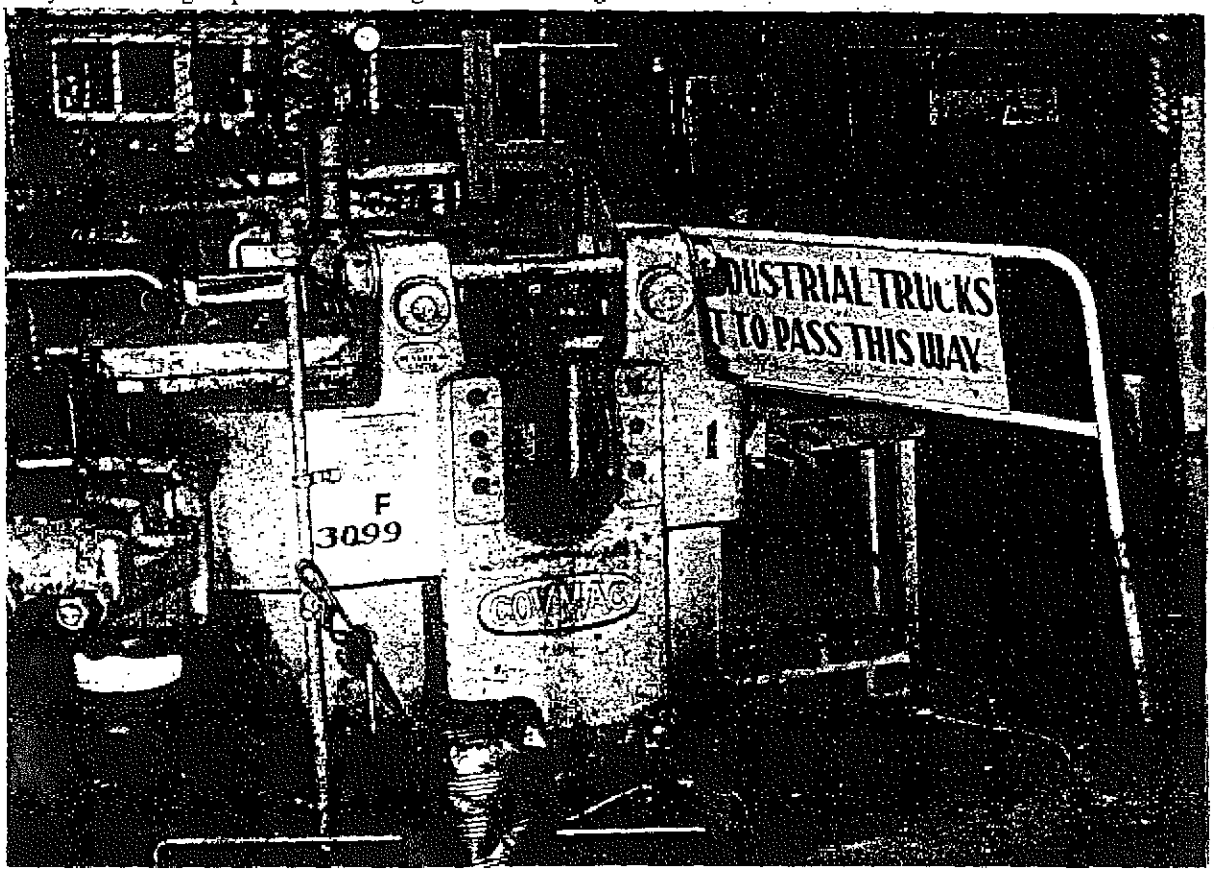


Illustration 2. 45: Bay 2 south. The cormac horizontal forging machine was used to produce track springs and heated steel rods. Photo by D. Godden 1984.

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. The location of items is shown on plans in Appendix E.

4.6.3 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.

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.

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.

The 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.

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.

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.

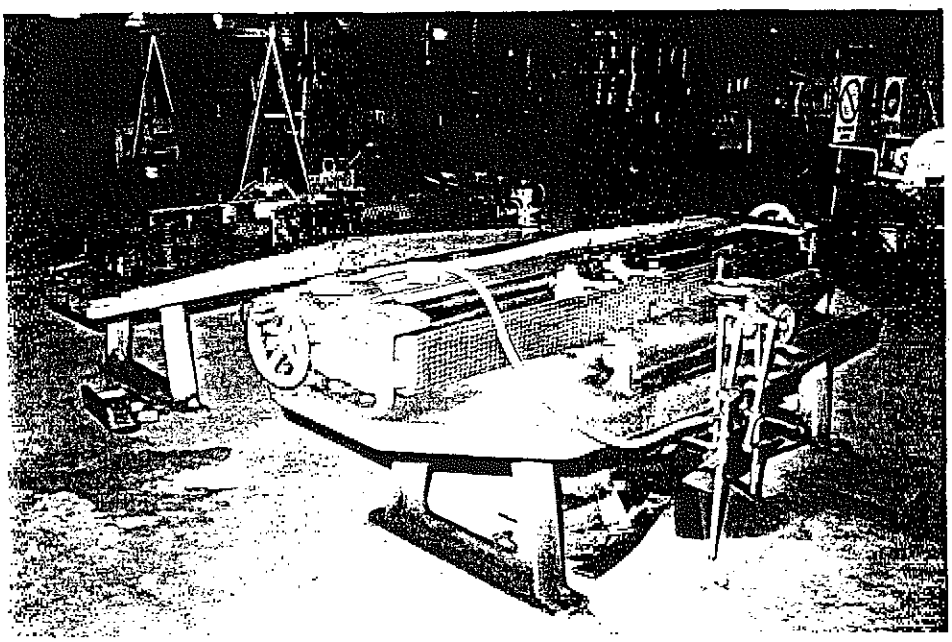


Illustration 2. 46: Bay 4 north. The Ryerson spring formers. Photo by D. Goldden 1985.

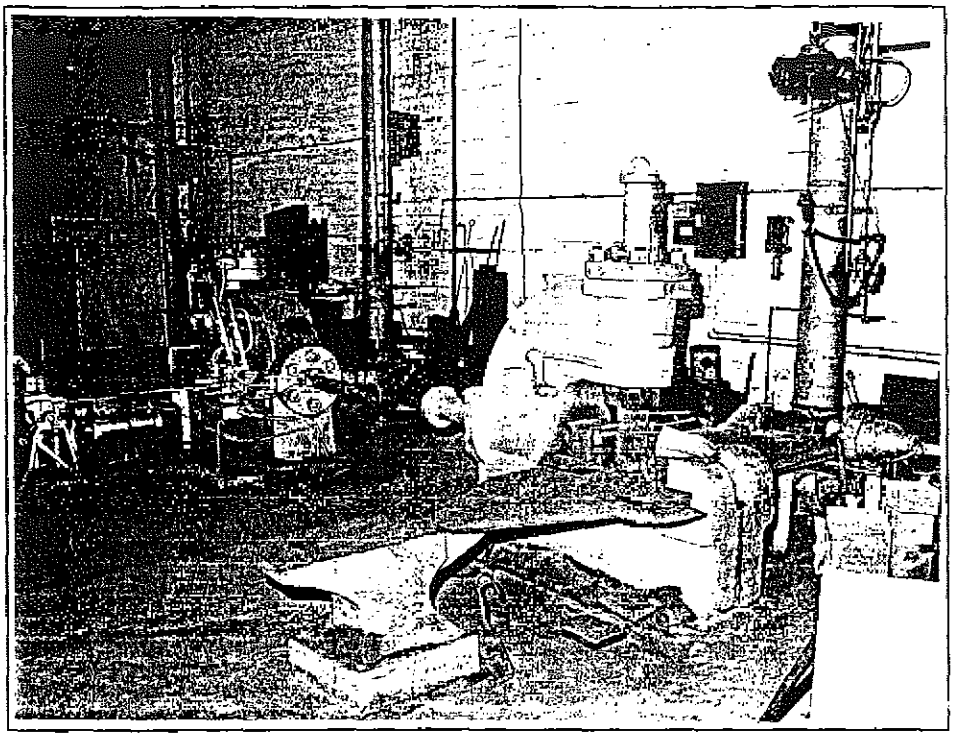


Illustration 2. 47: Bay 4 north. The Fielding & Platt hydraulic spring buckling press was used to assemble leaf springs. Photo by D. Godden 1985.

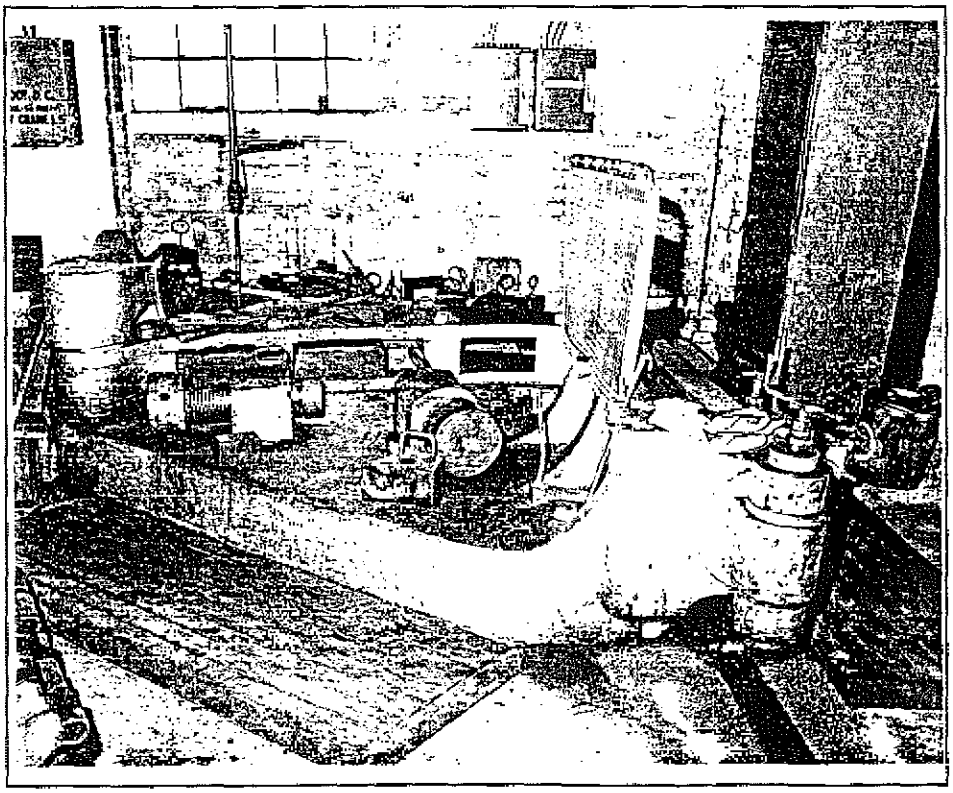


Illustration 2. 48: Bay 4 north. The Craven Bros hydraulic spring stripper was used to dismantle leaf spring for repair. Photo by D. Godden 1985.

4.6.4 Systems in the Workshops - Steam Power

The steam power system consists of four 36 class locomotive boilers, now oil-fired, 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.

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.

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 which 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 which have the same insignia. This indicates that the machine was specifically ordered from the manufacturers by the NSW Government.

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.

Operation is by a single lever which 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).

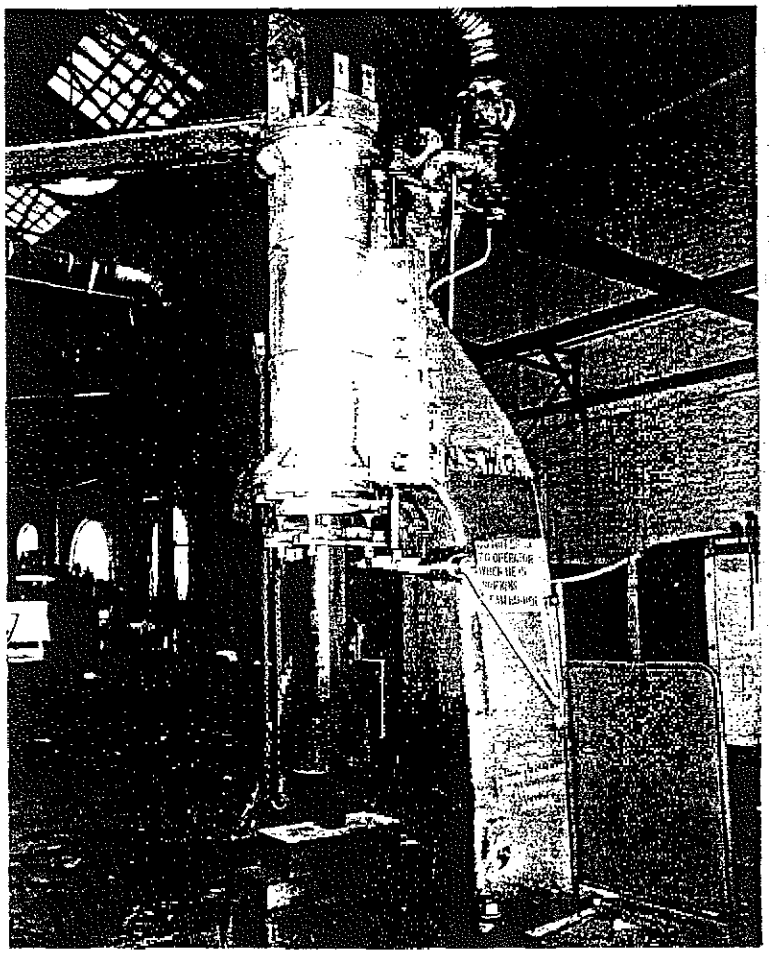


Illustration 2. 49: Bay 2 north. The 8.5 Cwt Steam Hammer is one of a collection of four which date from the 19th century. Photo by D. Godden 1985.

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.

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.

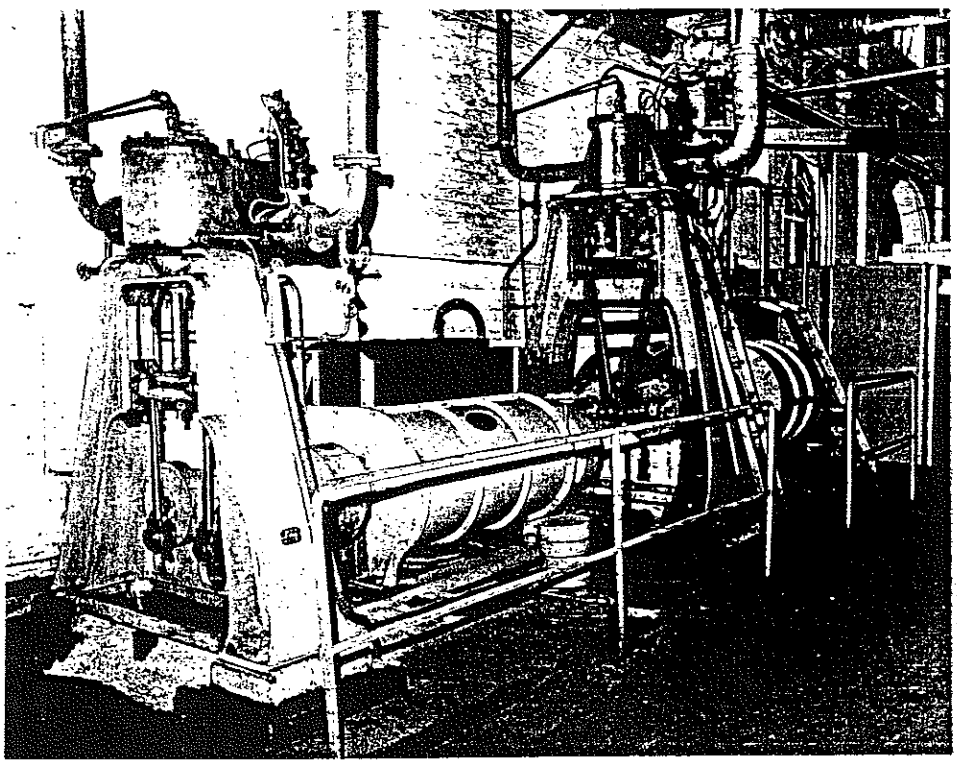


Illustration 2. 50: Bay 1 south. The Rootes Blowers by Bradford were used to supply high volume low pressure air to the furnaces. Photo by D. Godden 1985.

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 Davey press. The press stands almost 5m high and 3m across. Its operation involved a number of men under the control of a press foreman or supervisor. Ancillary equipment for the operation of the Davy include 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.

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 use of 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 which has been 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. 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 intensifiers and steam reservoirs is unknown. It is believed that no effort has been made to service these machines in the past 7 years. 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 this has checked any further corrosion.

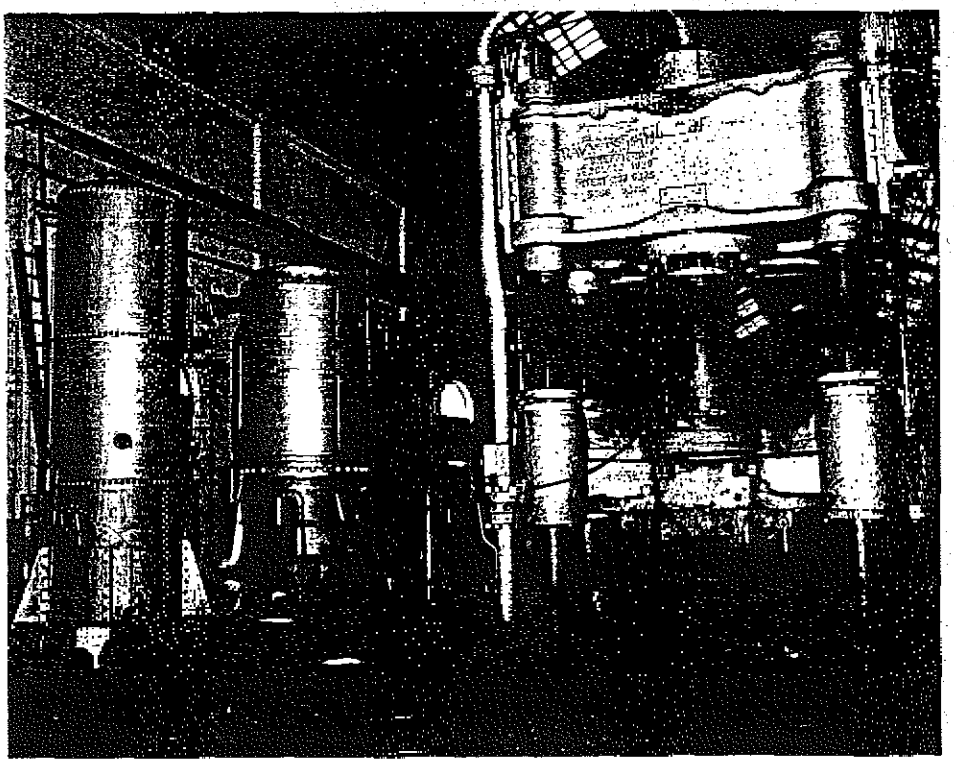


Illustration 2. 50: Bay 1 north. The massive Davy 1500 ton press was the largest machine installed at the Locomotive Workshops. Photo by D. Golden 1985.

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.

4.6.5 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 which 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.

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 which applies 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.

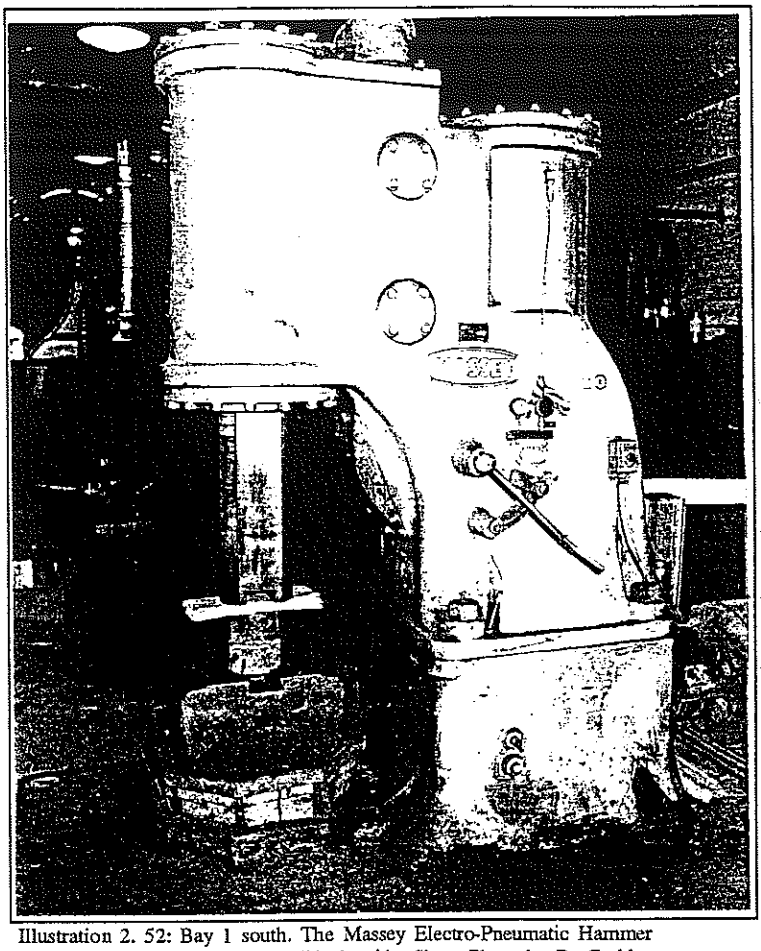


Illustration 2. 52: Bay 1 south. The Massey Electro-Pneumatic Hammer was a relative newcomer to the Blacksmiths Shop. Photo by D. Godden 1985.

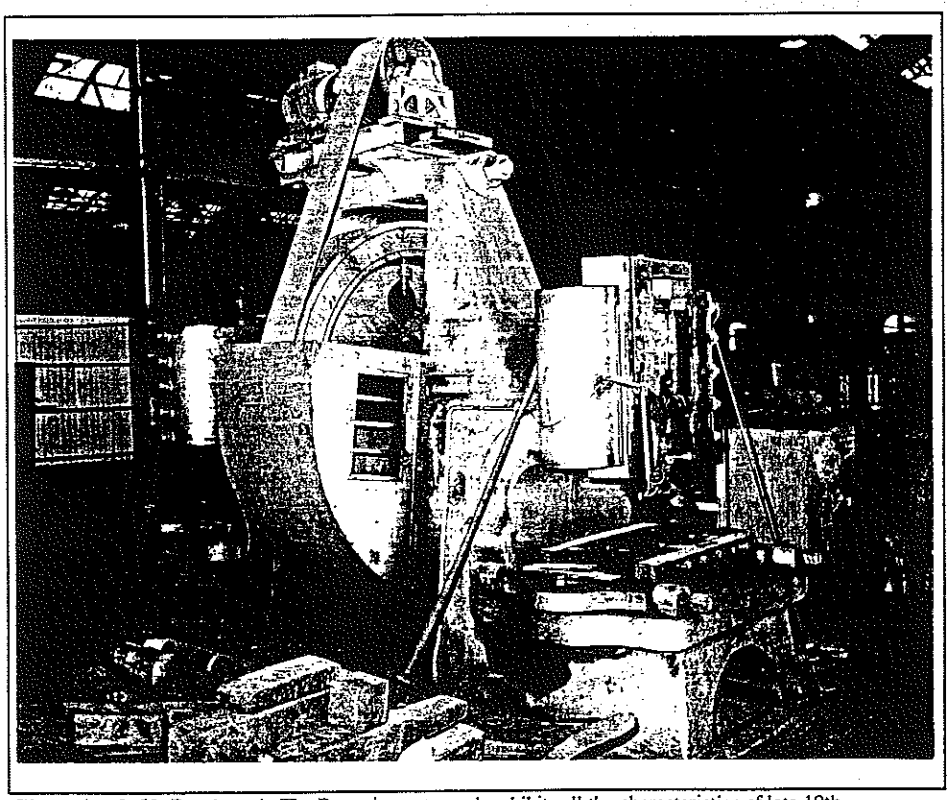


Illustration 2. 53: Bay 1 south. The Bretts impact punch exhibits all the characteristics of late 19th century medium engineering machinery with its massive cast iron body, lack of safety equipment and drive mounting. Photo by D. Godden 1985.

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.

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.

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 are presently located in Bay 4 south, southeast which corner is 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 has recently been operated.

A second small set of plate rollers are 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.

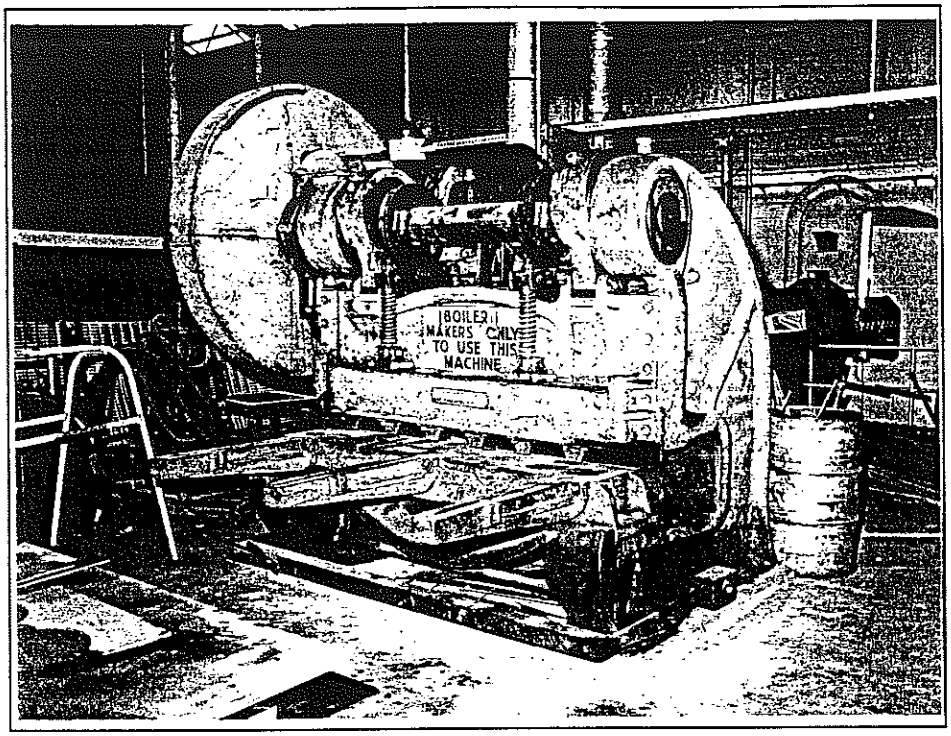


Illustration 2. 54: Bay 4 south. The James Bennie and sons metal shears were used by the boilermakers for cutting boiler shell plate to the correct size. Photo by D. Godden 1985.

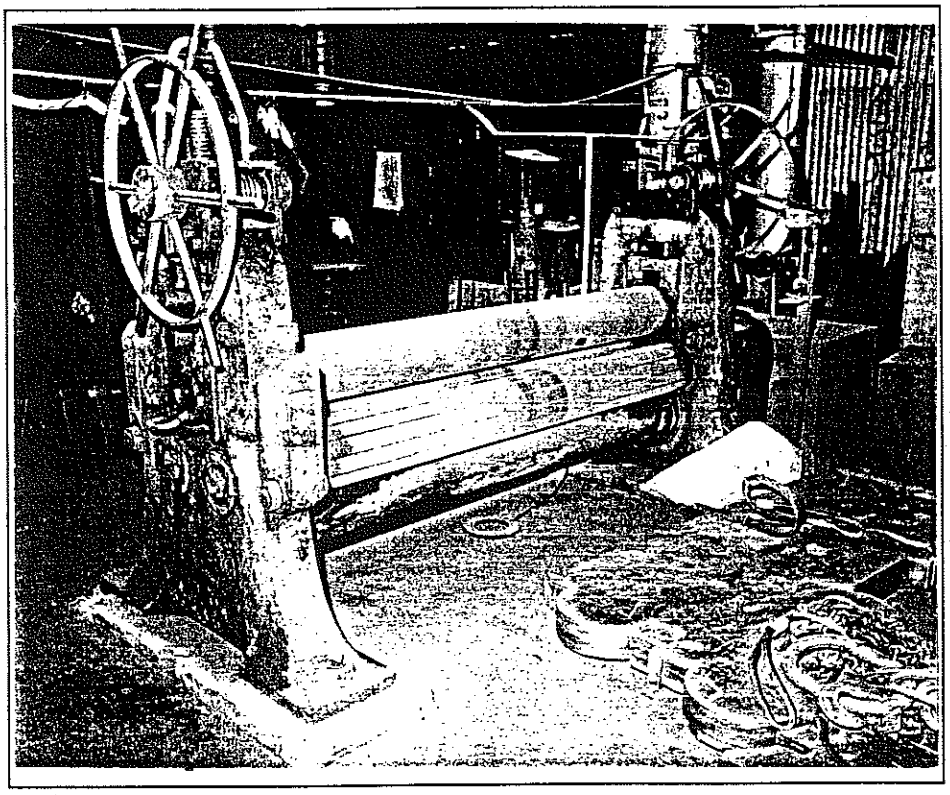


Illustration 2. 55: Bay 4 south. The Craven Horizontal Plate Roller was manufactured by Craven Bros. of Manchester in 1886 and is one of the oldest machines in the Workshops. Photo by D. Godden 1985.

The Continuous Forging Machine
This machine, by the Ajax Manufacturing Co., Cleveland, Ohio, USA, was installed in 1916. 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.

Collection of Swages
In a massive steel tool stand located at the south end of Bay 4 there are a series of dies and swages. 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 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 which run along the south wall of the workshops were amongst the most important. It is believed that both of these lines still exist beneath the tarmac which was laid when the Sydney Markets Authority took over the site in 1990. 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 9. These turntables can be returned to operating condition by stripping the bitumen from their surfaces. At the time the bitumen was laid the Markets Authority were informed that the tracks themselves and the turntables were to be covered in plastic sheet or sand so that the hot mix did not stick to them.

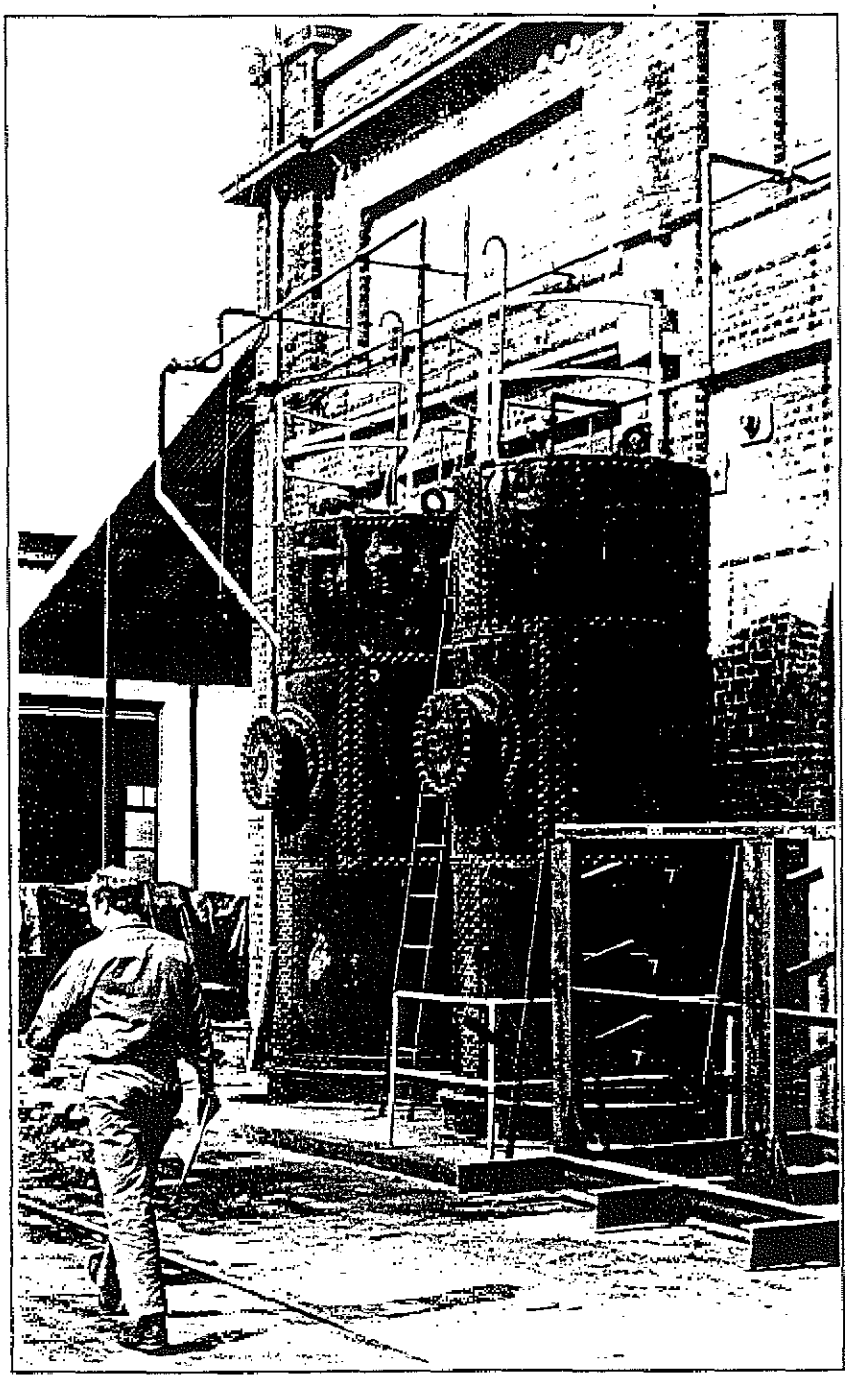


Illustration 2. 56; Bay 1 south exterior. Rail tracks and fuel oil reservoir. Photo by D. Godden 1985.

4.6.6 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 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 which were normally found 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.

NEW SOUTH WALES GOVERNMENT RAILWAYS

LOCO DEPT SYDNEY

50 FEET LOCOMOTIVE STEAM TRAVERSER 1894

SECTION AT A.B.

SECTION AT C.D.

SECTION AT E.F.

1 INCH SCALE

TRACING

915

72

Plan 3. 3 1884 drawing of the Locomotive Steam Traverser. Shows 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 7 & 13. SRAO ELW

4.6.7 The Traverser

The traverser is 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. Present traverser in the locomotive workshops is 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.

The condition of the traverser is good and a small external cabin has been erected over the original cabin and the pategram has been dissembled and stored in Bay 4A. 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.

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 for the east wall. The remainder will be similarly identified when the inventory is completed.

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 7, 13 and west of Bay 15.
- Pits in Bays 5, 6, 8, and 12.
- Footings and features of Core Store, Sand Store, Tinsmith's and Coppersmith's Shops in 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.

4.8 SERVICES

The services have not been examined in detail by this study and no expert advice has been sought. Several other reports have been done on the building services including the Rice-Daubney studies, the Ove Arup electrical services study and the A & A drains investigation. These should be referred to for detailed information but do not address heritage issues. The hydraulic and steam power systems are described earlier in this section.

Brief general comments are made on the services as a result of the building inspection. Of particular concern is the stormwater system which is causing the deterioration of building fabric. It is recommended that further investigation be carried out when necessary to document repairs.

Stormwater Drainage

The 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 5-15. Lines appear to run under the pits in Bays 5, 6, 8 and 12 and collect drainage from the pits. It is presumed that the downpipes are within the walls in 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.

As confirmed by the A & A report and observed on site many of the stormwater drains are blocked. This is particularly evident at the eastern end of the building with water overflowing from columns, damage to the east wall and flooding of the boiler pits in Annex 4.

Sewer Drainage

The 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 no heritage value.

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 is 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).

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 and enhance its value and should be retained. There is a limited installation of modern flourescent fittings.

Fire Services

A modern fire hydrant service was installed by Paddy's Markets though later disconnected. It has been recently reconnected at the valve at the south-east corner of the building and is currently operational. There are no sprinklers in the building and are largely unnecessary. Sprinklers or thermal detectors should be considered under timber mezzanines in Bays 5 and 15. Fire tunnels of concrete block were installed by Paddy's Market leading from the centre row to the north side of the building. They are not now poerational but can be made so.

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 which formerly ran over the road to the south of the building. The tanks and lines should remain.

5. HERITAGE SIGNIFICANCE

5. HERITAGE SIGNIFICANCE

5.1 BASIS OF ASSESSMENT

The basis of this assessment is the methodology and terminology of the *Burra Charter* and the *Conservation Plan*. This assessment is intended to enable decisions on the future conservation and management of the place to be based on an understanding of the significance of the place. The statement has been developed from an historical and physical understanding of the place as detailed in the previous sections.

- Section 5.2 analyses the evidence of sections 3 & 4 in terms of the SHI criteria (see below).
- The statement of section 5.3 explains that Eveleigh Railway Yards have a significance as a whole, over and above the significance of individual items. The significance of the yards as a whole is clearly integral to the significance of the Locomotive Workshops.
- Sections 5.4 and 5.5 are particular statements of significance relating to the ELW Building and the ELW Machinery respectively but which do not repeat the statements of Section 5.3. Sections 5.3, 5.4 and 5.5 should be read in conjunction with each other.
- Some of the statements detailed in Section 5.4 may apply to other buildings on the site and to the yards as a whole but this cannot be assessed as the other buildings have not been considered in detail.
- Section 5.6 defines levels of significance for the ELW.
- Section 5.7 summarises other authoritative assessments of the place.

The Burra Charter

The process of assessing cultural significance is set out in the *Australia ICOMOS Charter for the Conservation of Places of Cultural Significance* (Burra Charter). Article 23 of the Burra Charter states that *work on a place must be preceded by professionally prepared studies of the physical, documentary and other evidence, and the existing fabric recorded before any intervention in the place.*

Once the place has been studied, the cultural significance can be assessed. Article 1.1 of the Burra Charter defines *cultural significance* as the *aesthetic, historic, scientific or social value for past, present or future generations.*

The NSW State Heritage Inventory

Evaluation criteria for the assessment of cultural significance were developed by the Department of Planning as part of the State Heritage Inventory project. The criteria fall within two linked groups, Group 1 the nature of the significance and Group 2, the degree of significance. The following table, from the State Heritage Inventory provides a breakup of the different types of significance that need to be assessed prior to the establishment of Cultural Significance.

GROUP 1	**NATURE OF SIGNIFICANCE**	
Criterion 1	HISTORIC	is concerned with the range of historical context
Criterion 2	AESTHETIC	is concerned with creative or technical accomplishments
Criterion 3	SOCIAL	is concerned with community regard or esteem
Criterion 4	SCIENTIFIC	is concerned with research or archaeological potential
Criterion 5	OTHER	is concerned with other special values
GROUP 2	**DEGREE OF SIGNIFICANCE**	
Criterion 6	RARE	is concerned with the uncommon or exceptional
Criterion 7	REPRESENTATIVE	is concerned with the typical or characteristic

5.2 ANALYSIS OF EVIDENCE

Historic

The construction of the Eveleigh Railway yards was coincidental with the European massive expansion of the NSW rail/network which continued into the early 20th century. The closer settlement and development of the interior of NSW followed the expansion of the railways. Eveleigh was necessary to maintain and later construct the locomotives and carriages and many other items required for the railways to operate.

The primary historic value of Eveleigh arises from its place in the development of the railways. From this arises the associations with Whitton, whose vision was the driving force behind reluctant governments. His bust sits on the main concourse of the Sydney Rail Terminus. The association with Cowdery is important, about whom less is known but who appears to have been the technical problem solver of the time. It was he who was called in to rescue the zig-zag railway after major problems arose during its construction. A conflict between Whitton and Cowdery arose later over various bridges and over the Eveleigh Running Shed.

The Location of the yards at Eveleigh had an indelible influence on the urban fabric of the surrounding area. The small terrace houses were speculative developments to accommodate workers and postdated the workshops. This is evidenced even in suburb names such as Darlington. A photograph of the first locomotive on the Stockton - Darlington railway hung in Darlington School until its resumption by the University.

Other historic values of the place arise from its working life. As a workplace for thousands of skilled tradesmen whose work was critical for the operation of the railways, it was a fertile site for the pursuit of improved working conditions through the activities of the Union movement. Further the pursuit of leading edge technology resulted in continued technical development of power systems and machinery.

The machinery itself has important historic values. This arises from its survival from the steam age in situ. In other places equivalent machinery has been scrapped, moved or never existed. The machines and power systems also demonstrate the historic development of the place throughout its life.

The other essential element of its historic value is its continuos 100 year use as a workshop which impinges on all other values.

Aesthetic

The major aesthetic values for the place arise from the technical accomplishment of the architectural and engineering design of the place. The excellence of the design in turn relates to the historic values indicating the value placed on the enterprise. The aesthetic quality gives the place a value above its use as a workshop and relates to current appreciation of the qualities of the place.

The high level of design and workmanship are of a different character to residential and commercial buildings of the time and are particular to industrial buildings. A different aesthetic allowed the expression of the structure and a simplicity not expressed in other types of buildings until much later. This aesthetic is prominent today adding to present day appreciation of the aesthetic value of the place.

Another aesthetic value arises from the character of the whole complex. The consistent design, the groupings and the industrial character are still evident despite the closure. The machines themselves also have aesthetic value arising from their size and sculptural qualities.

Social

The social values of the place are the least studied or understood values of Eveleigh. This in part arises from their intangibility and the conflicting nature of some of the values. Further research is needed.

Social values are difficult to research requiring time and community consultation. The community of workers who may value Eveleigh are now dispersed and more difficult to contact. A better understanding of the social value of the place best be built up over time if a mechanism for collecting information can be established, possibly through future managers of the site.

The place clearly has social value which the authors of this report have become aware of over some years of involvement with the site. There was a tradition of excellence at Eveleigh and workers represented the highest level of trade skills in the community. Social value is also seen in the stories of workers, the comments of locals and the continuing community interest in the operating forge.

The size of the workplace over time means that there was a large community of workers with varying values about the place. Similarly the local community values some aspects of the place but not others such as the noise and smoke when it was operating. An indication of a feeling of "ownership" by the community is shown by the anti ATP slogan:- "Who's going to play at the Technology Park" which was used on car stickers etc.

The place is also an icon to daily railway travellers who view it everyday on their journey to work. It signals the approach to Central and entry or departure from the city.

Conflicting values are evident when the site is viewed as a union stronghold. Several unions have had a strong influence on and involvement in the site and major gains in working conditions were made at Eveleigh. It is also renowned for restrictive work practices which eventually led to the closure of the place.

Scientific

The scientific values of the place arise out of the potential of the place to reveal information about:-

- its physical structure and history through the analysis of archaeological remains and interpretation of the physical elements of the place;
- the operation of the premier railway workshop in NSW;
- the operation of the steam and hydraulic power sysyems which are unavailable elsewhere;
- historical industrial workplaces in general;
- Surviving machinery which is no longer made anywhere in the world;
- surviving structure and building systems demonstrating 19th century industrial technology.

These values arise both because of the nature of the place, surviving fabric and because of the potential archaeological deposits. Substantial areas of research remain to be carried out in relation to the place. The rarity of the place in size and quality, and its representative value as an industrial railway facility with authentic machinery increases the scientific value.

Its "interpretability" also contributes to scientific value and arises from the original design, the operational condition of machinery and the accessibility of the site. The combination of these factors give it unique scientific value.

Comparison with Newport and Midland

The other comparable railway workshops in Australia are the Newport Workshops in Melbourne and the Midland Workshops in Perth. Both have been studied in detail by M. & C. J. Doring.

The Newport Workshops are contemporary with Eveleigh and are similar in scale and quality. The original layout is assessed by Doring to be superior as an operating facility to Eveleigh as the loco and carriage shops are on either side of central facilities and are linked by a 'road' through the centre of the buildings. At Eveigh the yards are bisected by the main through lines which where already in this location when the site was purchased. At Eveleigh the yards are bisected by the main through lines which where already in this location when the site was purchased. The detailed design of the building is different to Eveleigh and its character is stylistically later. Individual buildings, especially the Locomotive Workshop, at Eveleigh are more carefully composed and are aesthetically of different and somewhat higher value. The Newport workshops have also closed and have been largely stripped of machinery and generally any machinery remaining is not operational. The operational machinery at Eveleigh adds to Eveleigh's significance in comparison with Newport. Newport however has a greater range of buildings surviving indicating the range of trades involved. At Eveleigh the Pattern Shop, Wheelpress shop, etc. have been demolished.

Midlands in Perth is an early 20th Century facility and in its original design is of a later period than Eveleigh or Newport. It is of different aesthetic character and is of steel, typifying a later generation of structural systems. Both Newport and Eveleigh have higher aesthetic value and represent a different type of structure and aesthetic. Midland however has a complete range of machinery and workshops and was operating when surveyed in 1994. It has been closed since then but the whole workshop is intact. Thus it has a superior capacity than the workshops in the eastern states to demonstrate the operation of a railway workshops. Its later date however means it does not have the range of earlier machinery and steam drive systems that where installed at Eveleigh and Newport. The future of the Midlands complex is at present uncertain.

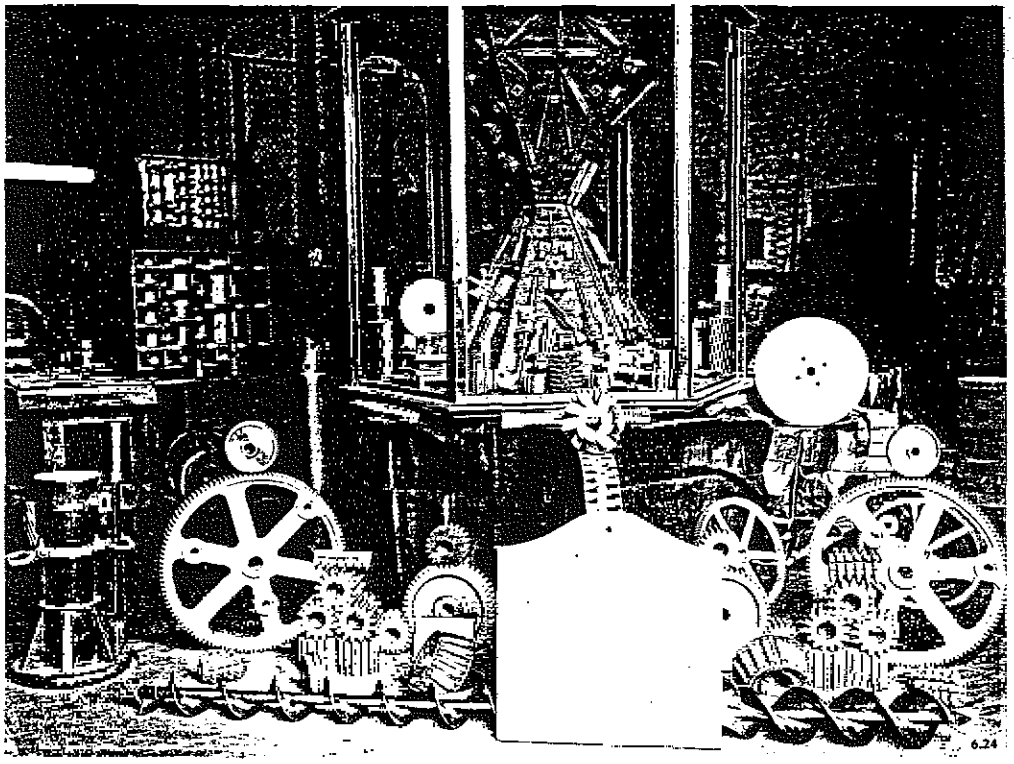


Illustration 2.57: A display of tools produced during the 1914-18 War. The sign reads "Previous to the war these tools were purchased. Now manufactured at Eveleigh Works." Burke p.127.

5.3 STATEMENT OF SIGNIFICANCE - EVELEIGH RAILWAY YARDS

The Eveleigh Railway Yards (ahead of Newport and Midland) are some of the finest historic railway engineering workshops in the world and Eveleigh contains one of the most complete late 19th and early 20th century forge installations, collection of cranes and power systems, in particular the hydraulic system. The place is of international significance and is one of the finest of Australia's industrial heritage items. The value of the place is increased by the fact that it is comprised of assemblages, collections and operational systems rather than individual items. Conversely, the significance has been reduced by its closure, relocation of some machinery and its disassociation from the operating rail network.

Historic

- The workshops were an important part of the NSW rail network which was instrumental in the development of the state during the 19th and 20th centuries.
- The construction of the workshops influenced the development of the local area (which was developed for worker's housing) both by providing employment and by its bulk and presence, starting bells and sirens.
- The yards were associated with developments in working conditions now crucial to the Australian cultural identity, eg. the *weekend* (Chronology 1892). The yards had an important association with the labour movement. The place was seen initially as a positive instrument of state socialism and in later periods as the site of important labour actions and of restrictive work practices.
- They were conceived by Whitton, the 'father' of the NSW railways, and were an integral part of his NSW rail system, and were executed in detail by Cowdery.
- The design of the buildings was associated with Cowdery coming to prominence and was a point of public conflict between Cowdery and Whitton which came to a head in a Royal Commission in 1884.
- The place was in continuous use as railway workshops for over 100 years until closure in 1988.

Aesthetic

- The whole complex has a strong industrial character generated by the rail network itself, by the large horizontal scale of the buildings, the consistent use of brick and corrugated iron, the repetitive shapes of roof elements and of details such as doors and windows and because of the uniform grey colours.
- The simple, strong functional forms of the buildings have landmark quality, not only as important townscape elements in the Redfern/Eveleigh area, but as part of the visual train journey of thousands of commuters, marking arrival in the city centre.
- The major buildings from the original 19th Century development of the site are well designed, detailed and built exhibiting a high degree of unity of design, detailing and materials.

Scientific

- The Eveleigh railway workshops have considerable research potential for understanding the operation of railway workshops. This potential is enhanced by the extent of archival material available and because the relatively recent closure means that there are many former workshop workers who are still alive and who know how the place operated.
- They have unique educational value enhanced by the highly accessible location and the relationship with the ATP and the three universities. They contain potential to achieve an understanding of the work practices of today through an understanding of the cultural continuity between 19th century technology and 21st century technology.
- There is potential for further research to yield information about the labour movement, labour relations and the nature of work practices in the 19th and 20th centuries.
- Archaeoligical remains have the potential to reveal further information about the operation of the Yards.

Social

- The Workshops were one of the largest employers in Sydney at the turn of the century declining only in the latter half of the 20th century. It was and is a source of pride in demonstrating the capacity of Australian industry and workers and a high level of craft skills.
- The place is significant to railway workers, former railway workers and railway unions and is associated with the stories of workers, locals, etc. which are important to cultural identity.
- Although no longer operating as a workshop, the place maintains symbolic value for the community as a former workplace and a place that provided economic input into the local area.

5.4 STATEMENT OF SIGNIFICANCE - ELW BUILDING

Historic

- The Locomotive Workshop (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.
- 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.
- The size and quality of the building indicates the importance of railways at the time.
- The Locomotive Workshops are part of the original construction of the Eveleigh Railway Yards.
- The building is associated with historic figures eg. Cowdery and Whitton, and historic events eg. strikes, parliamentary inquiry.
- 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.
- The building is historically associated with local industries and builders.
- 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 still exists in the mezzanine in Bay 5 South and which is supplemented by plans showing the layout of machinery for making ammunition.

Aesthetic

- The locomotive workshop 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.
- 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 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 providing structural support and the integrated system of columns, girders, crane tracks, gutters and downpipes.
- The building is an excellent example of a major building designed by George Cowdery and with the carriage Shops are the best surviving examples of his work.
- 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.
- The building has elegant, restrained and well proportioned brick facades with stone dressings.
- The building has a high degree of integrity and authenticity including the building itself, ancillary structures, the machinery, the rails and cranes and current and former drive and power systems. Other components of the place are known to exist under the bitumen floor, including rails and pits in some bays.
- The building 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).

Scientific

- The building has potential to reveal information about construction techniques and design of cast iron, worught iron and steel 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 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.
- The building has educational value inshowing architectural taste in how classical rules were applied to all parts of the building.

5.5 STATEMENT OF SIGNIFICANCE - ELW MACHINERY

Historic

- The building houses the most complete set of authentic and operational late 19th century and early 20th century forge and hydraulic power technology in Australia, superior to anything in the UK or USA. Midlands, 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.

Aesthetic

- The machinery, in particular the cranes and the machinery in Bays 1-4a, are an essential component of the sense of place and are an integral part of its industrial character.
- The Davy press is the largest operating steam press in Australia.
- The building houses the only known operating hydraulic system of its kind in Australia.
- The collection of overhead cranes is the best in Australia.

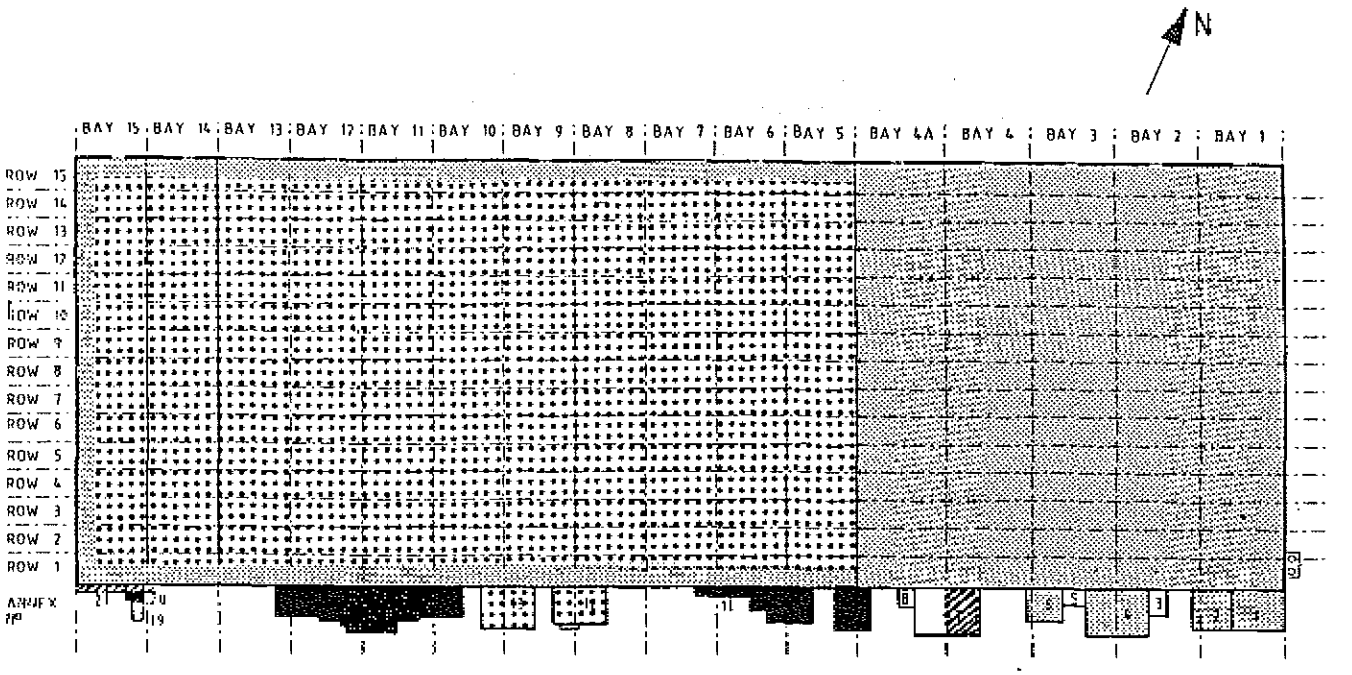
Scientific

- 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.
- As Australia moves into the 21st century the survival of complete examples of 19th and 20th century machinery and technology will be vital to an understanding of Australia as an industrial nation.

5.6 LEVELS OF SIGNIFICANCE

The following system of levels of significance has been adopted and the levels are indicated on the plan below. Levels of significance are indicated in detail in the building inventory. Recommended treatment for each level of significance is in section 7.6 (page 159) of this report. The term interpretation or interpretability is used in the sense of the ability to explain the meaning of the place/item, of making the significance of the place understood.

Outstanding	of national significance, high degree of interpretability
High	of considerable significance, original or early, able to be interpreted
Moderate	of significance, significant changes, relating to function and development, able to be interpreted
Low	of slight significance, difficult or unable to be interpreted, not important function, often subject to alteration, detracting from significance and/or significant fabric.
Intrusive	damaging significance and/or significant fabric



Plan 3. 4 : Plan of the Eveleigh Locomotive Workshops indicating levels of significance. NB. Outstanding value is for the complex only, do not ascribe to individual elements.

Outstanding

The whole complex, comprising buildings, systems and machinery is ascribed a level of **outstanding significance**. This cannot be ascribed to any individual items and is not used in the inventories. Bays 1 - 4a as a whole including contents and the envelope of the remaining bays are of outstanding significance. Bays 1-4a are of higher significance than the remaining bays because they house operational machinery and the collection of machinery removed from other bays. Neither the building nor the machinery can be ascribed this level of significance individually.

High

Items of **high significance** are those which date from the original construction phase or are early additions. They are of the highest level of design and workmanship and are crucial elements of the workshops' function. Such items may indicate the former uses of the building or technological developments. Items of high significance can be easily interpreted and understood to providing information about the primary functions of the place. Examples are:

- The external elevations including polychrome brickwork and sandstone trim, cast iron window frames and timber ledged and braced doors.
- The internal structure of the building including cast iron columns, lattice girders, wrought iron trusses and lantern roofs.
- The extensive internal spaces.
- Annexes 2, 4, 6, 12, and 13 on the southern wall.
- The major machinery and extant collection of machinery in bays 1 - 4 and Annexes 1, 2, 4 & 6 and adjacent to the building.
- The elements of the various power systems - steam, hydraulic, oil, compressed air, electricity, etc.
- The collection of overhead gantry cranes and related early walkways eg. on brackets on end walls..
- The remains of the line shafting and any steam line or engine mounts.
- Sub-surface remains such as rails, turntables, flues, footings.
- Roof glazing in Bay 15.
- The traverser to the west of the building

Moderate

Items of **moderate significance** are those which perform a secondary function in relation to the operation of the workshops. 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:

- The mezzanines in Bays 5 south & 15.
- The remains of external, high level toilet facilities on the south side of Bays 6 & 15.
- The remains of the monorail on the north and west facades.
- Various minor alterations such as high level windows in the west wall, and in bay 3 north wall
- Various external pipe runs on brackets.
- Internal lights
- Attachments such as fire telephones etc., and ephemeral items such as the wall of lottery tickets on a railway wagon tarpaulin and other evidence of workers use of the building.
- Installations of basins and other facilities
- Foremens/supervisors offices.
- Annexes 7 (eastern part) & 21.

Low

Items of **low significance** may be early fabric, which has been subject to unsympathetic alteration, or additions. This fabric includes modifications to the building where, although they indicate the changes in use of the building over time, the actual fabric does not have a high level of significance. Items may be difficult or impossible to interpret or may be detracting from the significance of the place and fabric of greater significance, it may be a modern installation that does not harm the original fabric. They include:

- The corrugated fibreglass rooflights
- The skim coat to the floor
- Infills to some windows
- Runs of unrelated services, eg electricity lines on north wall
- Modern access ladders.
- Inserts and attachments the origins and purpose of which is unknown.
- Modern cable trays and temporary attachments and facilities eg. fences.
- The Bay 5 north mezzanine.
- Annexes 3, 5, 7 (western part), 8 and 19.

Intrusive
Those items which, in their present form adversely affect the significance of the place have been assessed as "**intrusive**" (INT). This category includes fabric whose introduction may have resulted in damage to significant fabric. It also includes visually intrusive fabric and fabric which obscures the reading of the significant uses and periods of development of the building. They include:

- The aluminium windows in the east wall.
- Various inserts in the east wall, eg. the added beam in Row 15, which are rusting and damaging significant brickwork.
- Annexes 9, 10, 11, 14, 15, 16, 17, 18 & 20 on the south wall.
- The high level opening in Bay 5, north external wall.
- Lift motor room, Bay 15.
- Features added by Paddys Markets eg. fire tunnels, steel fencing in bays 1-4.

5.7 EXISTING ASSESSMENTS

Australian Heritage Commission

The Australian Heritage Commission lists the Eveleigh Railway Workshops on the Register of the National Estate. The statement of significance for the place includes the following:-

Eveleigh Railway Workshops serve as the greatest monument to the history of transport in New South Wales. The buildings are fine examples of late nineteenth century and early twentieth century industrial buildings. The machinery and technology housed in them is a chronology of industrial development from the 1880s to the present day. The nineteenth century buildings display precisely detailed brickwork, strong period character and elegantly defined facades to some of the longest runs of load-bearing brickwork in Australia. The steel-trussed roofs resting on cast-iron columns in the Locomotive and Carriage Workshops form two of the largest continuously-covered nineteenth century industrial spaces in Australia.

National Trust

The site is listed with the National Trust of Australia (NSW. The listing states:

Eveleigh represents the importance of the place of railways in the development of New South Wales. It was also one of the largest employers in the state. The workshops represent the oldest intact large operating railway complex in New South Wales. They were originally conceived in 1872-75 by John Whitton who was the most influential figure in the history of the NSW railways.

Sydney REP No. 26 - City West

The REP schedules the Locomotive Workshop Bays 1-15 as an heritage item, including machinery in Bays 1-4.

Comment

The above assessments of significance of the Eveleigh Workshops where prepared prior to historic machinery being relocated from Bays 5-15 to Bays 1-4a in 1989, in order to accommodate Paddy's Markets. The heritage significance of the place is linked with its past use and machinery, therefore it is necessary to regard the Locomotive Workshops as an operational assemblage in order to maintain its cultural significance.

6. CONSTRAINTS & OPPORTUNITIES

6. CONSTRAINTS & OPPORTUNITIES

6.1 IMPLICATIONS OF HERITAGE SIGNIFICANCE

In order to formulate conservation policy for this building it is necessary to take into account a number of factors and constraints which are commented on in this part of the report.

As noted in the Statement of Significance, Eveleigh Locomotive Workshops has historic, aesthetic, social and scientific values and has a very high degree of significance and integrity. The legislative controls require that the Locomotive Workshops, and other buildings, must be conserved. Any unsympathetic works will be detrimental to the significance of the place and to the historic precinct as a whole. Works should maintain the integrity of the building as well as the integrity of their context. The continued use of the buildings as operational workshops is important to maintain the integrity of the complex, and any adaptation and upgrading should enhance rather than detract from the significance.

The exceptional value of the place as a whole and the level of value over other similar places rests 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 operational 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 technological significance of the structure offers opportunities for interpretation and suggests direction 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 and this value 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. 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 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

6.2.1 Australian Heritage Commission

The Australian Heritage Commission is a Federal Government authority which maintains the *"Register Of The National Estate"* which is an inventory of places of significance. The Eveleigh Railway Workshops are listed in the National Estate Register, as described Appendix A. The Commission imposes obligations on the Federal government bodies but not on private owners or State or local governments. It does however draw the attention of the State or local government heritage bodies to items on the Register. Commonwealth funding eg. Better Cities funding, cannot not be used for any purpose which is detrimental to the place's significance (unless there was no prudent or feasible alternative).

6.2.2 Sydney R.E.P. No. 26 - City West

The Department of Planning is the State Government department that deals with environmental planning issues and administers the Environmental Planning & Assessment Act 1079 (EP & A Act). Under this act the Department prepares State Environmental Policies (SEPP's) and Regional Environmental Plans (REP's).

The Sydney REP No. 26 - City West (amendment No. 1 - Eveleigh precinct) applies to the Locomotive Workshops. The REP supersedes previous LEPs which no longer apply. The aims of the REP are to establish planning principles and develop controls of regional significance for development in the Eveleigh Precinct. The City West and Better Cities Branch of the Department of Planning assesses all development applications for the Eveleigh Precinct. The Minister for Planning is the consent authority for the master planning area, which includes the Locomotive Workshop. Relevant clauses from the REP are summarised below:

Clause 10 states that items of heritage significance are to be conserved and enhanced. The re-use of heritage buildings through adaptation and modification is to be encouraged.

Clause 14 states that any development of the building requires the consent of the Minister of the Department of Planning. The consent authority may request a Conservation Plan to accompany an application for development consent relating to an Heritage item.

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.

6.2.3 Urban Development Plan

An urban development plan was prepared in terms of clause 36 of Sydney Regional Environmental Plan No. 26 - City West and adopted by the Minister for Planning on 13th July, 1993. Clause 34 of the REP requires the relevant consent authority to take any relevant urban development plan into account when granting consent to a development application. Development principles and controls include:

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.

Consideration must be given to an appropriate level of conservation of Bays 1-4a 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. In addition, adjacent new development shall be compatible in scale, height, form and materials.

6.2.4 Master Plan

The REP and its associated urban development plan require a master plan for the ATP site. A Master Plan was prepared for Australian Technology Park Sydney Ltd by Keys Young on behalf of the City West Development Corporation and adopted by the Minister for Planning in September 1994. The extent of the area is shown on the following plan. A Master Plan is a step in the planning process between the REP (and associated UDP) and a development application. The objectives in respect to heritage conservation are to evaluate, conserve and re-use valuable heritage items and to respect their character through the juxtaposition of new buildings. The general heritage requirements are:

- to conserve the Locomotive Workshops,
- where possible to conserve the traverser and equipment adjacent to the Workshops
- to record items not conserved
- that development to the south of the Workshops be sympathetic
- to undertake archaeological surveys in the building before any disturbance

The Master Plan sets out urban design guidelines in relation to the Locomotive Workshops and attached annexes, and includes a Locomotive Workshop Control Plan (see illustration). The guidelines for the Workshops are to:

- conserve and re-use the existing main building fabric
- to conserve and adapt the early annexes on the south of the building, to remove as necessary less sympathetic additions and to construct new sympathetic additions in this location as required
- feature Bay 7 as the central axis and pedestrian entry
- provide a pedestrian route through the centre of the building from Bay 7 to the Innovation plaza
- provide main vehicle access from the south side.

6.2.5 NSW Heritage Act 1977

The place is not subject to an order (ICO or PCO) under the Heritage Act.

General archaeological provisions of the act apply including Section 146 which requires that *"disturbance or excavation of land containing or likely to contain relics can only take place when an excavation permit has been granted by the Heritage Council. An application for a permit should be made to the Secretary of the Heritage Council"*. "RELIC" is defined as *"any deposit, object or material evidence which relates to the settlement of the area that comprises New South Wales, not being aboriginal settlement; and which is 50 or more years old"*. An archaeological permit and an archaeologist is required if excavation is likely to contain relics.

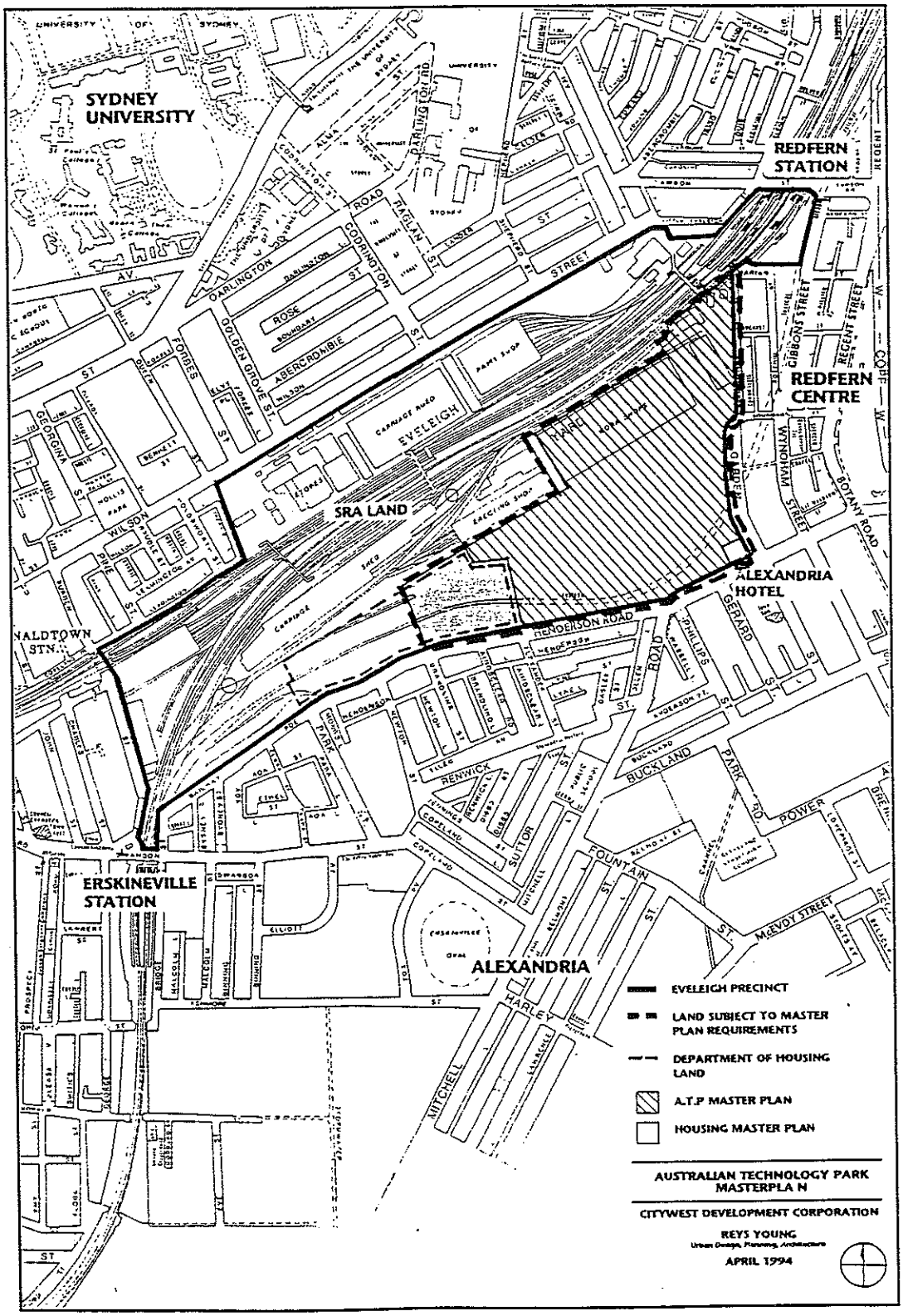
The current philosophy regarding the conservation of archaeological remains is that they are best conserved by remaining undisturbed. Excavation is only undertaken if a full scale redevelopment of the site is to be undertaken which would result in the loss of all deposits.

Section 170 of the Heritage Act requires government building owners to prepare registers of places of heritage significance under their ownership or control. The Locomotive workshops were on the SRA Section 170 Register before transfer of ownership and should be on a CWDC Register if one is prepared.

Note

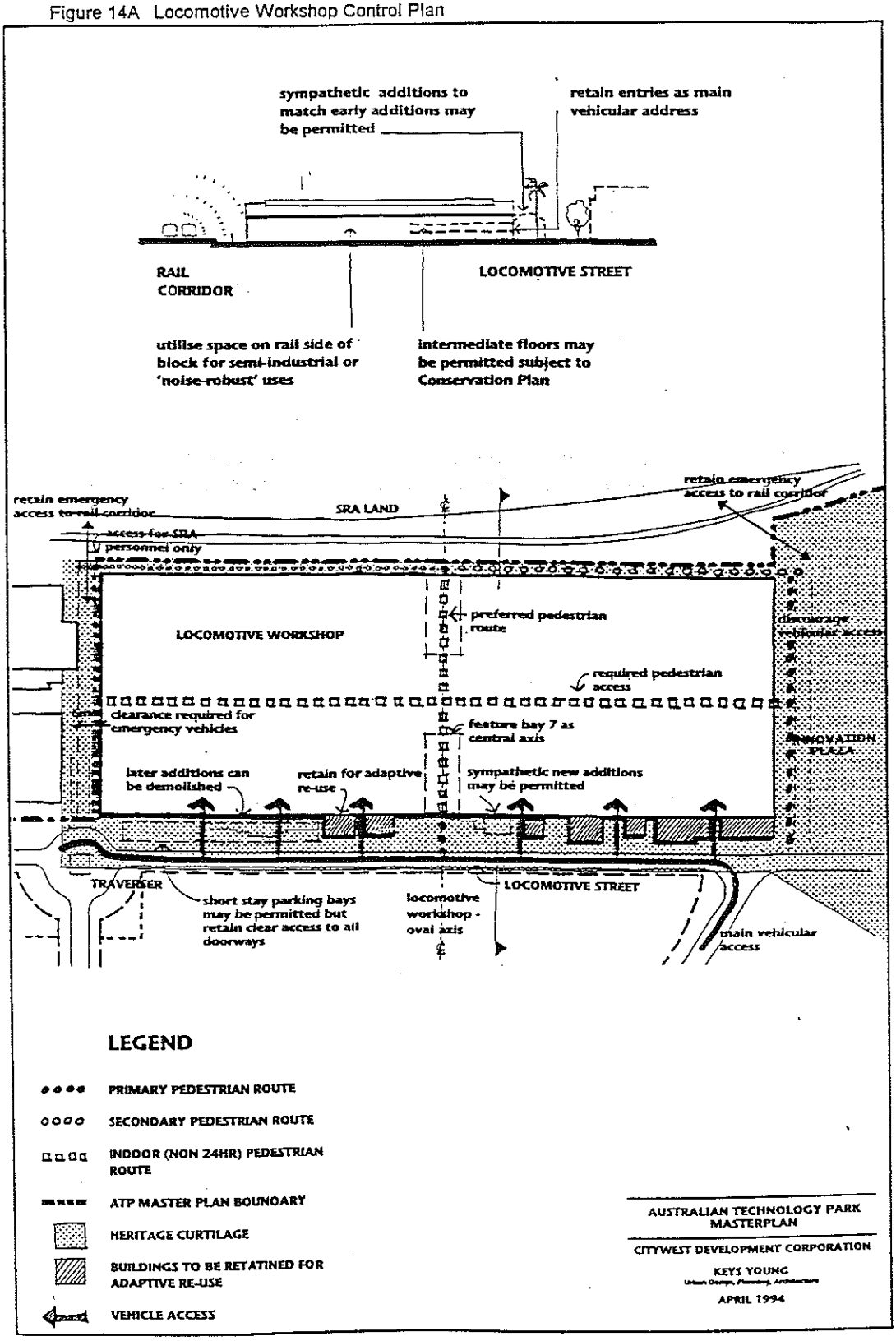
The Eveleigh Precinct Conservation Policy was written by Schwager Brooks and Partners for the DOP in 1994. It was adopted in 1994 and its requirements are detailed in section 7.2 of this report (page 130).

Figure 3 Master Plan Areas



Plan 4. 1: Master Plan area. Master Plan 1994

Figure 14A Locomotive Workshop Control Plan



Plan 4. 2: Control Plan. Master Plan 1994.

6.2.6 South Sydney City Council

The site is within the local government area of South Sydney City Council, but is a deferred item and is not subject to the Local Environment Plan 1990. The council has no development consent authority role in relation to the master planning area, including the Eveleigh Locomotive Workshop but the REP calls for consultation with council before the Minister grants consent to a DA. Council retains development consent authority under the REP for the remainder of the Eveleigh Precinct. Building approvals are required for private developments but are not required where the government is the applicant.

6.2.7 National Trust

The National Trust of Australia (NSW) is a non-government community organisation established in 1945 and incorporated by an Act of the New South Wales Parliament in 1960, dedicated to the conservation of Australia's heritage. It compiles and maintains a Register of places of heritage significance. The workshop is listed as part of the Eveleigh Railway Yards. The National Trust does not have any statutory powers but is influential and persuasive on environmental matters.

The implications of being classified by the National Trust are that the responsible authorities, the property owners and public are alerted to the significance of the item, so that appropriate measures are adopted by those concerned to preserve the special qualities of the item. Any "*harm*" or insensitive proposal to a listed item may provoke community protest and public opposition. The National Trust has a keen interest in the future of Eveleigh through its participation in the Railway Heritage Committee of SRA.

6.2.8 Ordinance Compliance

The Building Code of Australia is the operative building ordinance for the conservation and re-use of the Locomotive Workshops. The BCA covers those aspects of the building which are controlled by legislation such as structure, fire resistance, access and egress, fire-fighting equipment, mechanical ventilation, and certain aspects of health and amenity. Of these, the most critical issue will be compliance with fire suppression and egress provisions in the adaptive re-use of the building.

The requirements for compliance with 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 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.

6.3 IMPLICATIONS OF EXISTING CONDITION

The existing condition of the building is generally good. The building is not in danger of collapse or accelerated deterioration. The structure as a whole is stable with limited areas of instability. The overall good condition and durable nature of the construction adds to the financial value of the building. However there are problems resulting from inadequate maintenance, poorly considered alterations, wear and tear and possibly foundation movement. There has been long term neglect of maintenance leadind to physical damage which has accummulated over many years. There is also some more recent damage, mostly to glazing, from vandalism. Immediate problems have been identified in recent surveys of the building.

The most serious long term problem is blocked drains, particularly at the east wall with water penetration at downpipes embedded in the brickwork. Other problems are damage caused by subsidence and possibly by brickwork expansion. It is essential that the problem of stormwater disposal, which could result in further fabric deterioration, be addressed and resolved as soon as possible in order to deter any further deterioration of the existing structure and building fabric.

The building has a series of box gutters running across the building between each bay. These discharge at 20foot centres into the columns which serve as downpipes. These are linked to vitreous clay drains below ground which, A & A pipe Testing confirms, are largely blocked and inoperative. The drains run along each bay discharging to the north. The blocked drains cause water to bank up in the column downpipes and shower down from various high level junctions. This is inconsistent with the use of the building for most purposes and damaging to the materials of the building. At the external walls the downpipes are embedded in the brickwork with cast iron boxes within the walls forming rainwater heads. In the case of the east wall blocked drains have caused water to leak into the wall, rusting and expansion of the downpipes resulting in vertical cracks in the brickwork. In wet weather water sprays out of this wall at high level. Its neglect is causing continuing deterioration of the brickwork. In Annex 4 the drains to the pit in which the boilers sit are blocked and the boilers, which are relics of high significance, in wet weather sit in a deep pool of water.

Returning the drains to operating condition by clearing, repair and/or replacement is urgently required to make the building habitable and to reduce the rate of deterioration of the materials of the building and the machinery. Any such work must be designed and carried out carefully and with the knowledge that there are considerable underground remains should be supervised by an industrial archaeologist

Other implications of former neglect are summarised below:

- Roof leaks - areas under are not habitable, dangerous near electricity.
- Parapets at north-east and south-east corners are unstable and need rebuilding.
- Missing doors / chain wire doors - not secure from weather, birds, dust, people and allows more noise into the building.
- Limited power - unsuitable for use at night or for purposes needing high light levels or power, cranes cannot be used..
- Limited areas of deteriorating stonework- unsafe, needs assessment and removal by mason.
- Minor localised subsidence - May move gutters out of alignment, should install tell-tale to monitor.

Many parts of the building need work before it will be suitable for lease or use for any commercial purpose. Funds will be required to execute these works, which are essentially the building infrastructure before any rental income can be received.

6.4 CLIENT'S REQUIREMENTS

City West Development Corporation

CWDC is the owner of the building, the ownership having been transferred from the SRA in March 1995. The CWDC is a statutory corporation established by the NSW Government in 1992 pursuant to the Growth Centres (Development Corporations) Act, 1974. The corporation was answerable to the Minister for Planning to whom it submitted annual reports and who appointed Members of the Corporation. The Managing Director of the Property Services Group and four appointed members formed the CWDC Board who managed the operations of the CWDC. Following the recent change of government, the CWDC now comes under the portfolio of the Minister for Urban Affairs and Planning with the Department's Director General replacing PSG's Managing Director on the Board. The CWDC was established to manage the redevelopment of State Government owned land in the City West Region. The City West region comprises four precincts: Ultimo/Pyrmont, Eveleigh, Central and The Bays.

Funding to the CWDC has been provided by the Commonwealth and State under the Better Cities (BC) four year program finishing in June 1996. The BC program is concerned with urban redevelopment and its objectives are for more efficient, environmentally sustainable and socially just urban growth and change. The Eveleigh BC program provides $18 million over four years up to 1996, the BC funding is not allocated for building works to the heritage buildings but does cover some infrastructure works associated with the buildings.

The role of the CWDC is to manage the land, manage the provision of BC infrastructure, and to promote and encourage development and investment in line with social and environmental objectives. CWDC was responsible for the ATP Master Plan in 1994. The key features of the BC area strategy for Eveleigh are :

- development of an ATP,
- encouragement of a range of housing options,
- conservation and sympathetic re-use of major heritage buildings,
- provision or augmentation of essential utilities, community services and open space.

The CWDC will be progressively leasing areas of the ATP site on the basis of 99 year leases. The aim is that the Master Plan area will be leased to the ATPSL under an agreement that areas can be drawn down from the overall site by the ATPSL on a progressive basis. Thus the Managers Office and the New Engine Shed will be the first areas, leased respectively for the Australian Graduate School of Engineering Innovation (AGSEI) and for the National Innovation Centre (NIC). Further funding has been made available from the state government for works to these buildings, approvals have been gained and contracts for works let. Funding of $10.8 million dollars has been allocated to the New Engine Shop and the Works Managers office for expenditure over a three year period. Funding of $5 million has been allocated to the Locomotive Workshop for expenditure over a five year period. The funding is to cover building and site management, services and maintenance as well as building works. The funds are being administered by the CWDC.

Works have also been commenced on the public domain areas as shown on the plan, funded by the BC program. This work involves the excavation of the space to the east of the Locomotive Workshop which is likely to disturb the remains of the spring shop. An archaeologist, Wendy Thorp, has been engaged with a watching brief for this project. The contractor for the NIC and Stage 1 of the public domain works is Barclay Mowlem Construction Limited.

It is envisaged that there will be an intense phase of development during the BC program which will taper off. The CWDC will be the continuing land owner with the ATPSL taking on a larger role as it takes up more ground leases. The Locomotive Workshop will ultimately be leased to the ATPSL but is also likely to be leased progressively. In the interim the building may be leased for temporary uses.

The CWDC is licencing Bays 2 & 3 South to Wrought Artworks who are currently occupying these areas and had a lease with the SRA. This is seen as providing for a degree of maintenance and security and some informal curatorial and interpretive advice on heritage machinery and relics. The southern part of Bays 5 & 6 is occupied by an emergency electrical section of the SRA. Bays 7 & 8 are occupied by PW (CWDC's project manager) and the contractor for the NIC and public domain works.

The current construction works will limit access to the workshops and it is not proposed to lease the remainder of the building until 1996. After this the building will be available for interim uses until taken up by the ATPSL. There is a continuing demand for the use of the building and examples include; theatrical productions, large dinners, movie sets, product or program launches, storage of new cars, training (fire fighters, etc.), storage, etc. which will be considered when the building is available.

To cater for current occupants, part of the $5million funding will cover the change over from SRA power to Sydney Electricity power for the building (as it does not comply with Sydney Electricity standards). The current program is also providing some security and emergency maintenance works to ensure the safety of building users and passersby.

To cater for interim uses a certain minimum level of services is required which can no longer be provided. There will be no power in these areas and it is difficult to provide it safely while the building is not watertight. Water and light need to be available for toilets. For public events there needs to be a minimum level of fire safety which is not provided. In the past theatrical events and the like have been required to provide their own fire safety with extinguishers and fire wardens on duty and have provided their own power. They have also been required to submit a temporary DA to the local council and to satisfy their requirements as to fire safety. For longer term interim leases difficulties include how to service, drain, subdivide, etc. individual bays or portions thereof if smaller areas are required. Other concerns are whether the limited infrastructure funds or other funds which may become available should be applied sequentially to bays (eg. Bays 1 - 4a, 5 - 9, 10 - 15) or to address specific issues throughout the building (eg. watertightness and drainage).

Australian Technology Park Sydney Limited

ATPSL is a company, registered in 1993, and formed as a joint venture between the University of Sydney, University of NSW & the University of Technology, Sydney. It is controlled by a Board chaired by Mr J.C. Conde, AO, and which includes the vice-chancellors of the universities and three representatives of private industry. Mr Tom Forgan is the Project Director. The role of the ATPSL is to establish and manage the technology park and their mission statement is

> *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.*

ATPSL envisages a 7 - 10yr+ developmental time frame for the site responding to market needs. They are committed to develop the site, ie. the area covered by the Master Plan, progressively from the north east corner rather than randomly (this applies to the Locomotive Workshops also). This is in keeping with the ATP's concept of synergy and the need to keep people close together and interacting. Temporary use of parts of the Locomotive Workshops are consistent with this.

A world opening of the ATP is planned later this year when the contract is completed for the NIC and landscaping, in November. It is proposed to be held in 'Innovation Plaza' - the space between the Loco Shed and the NIC (New Engine Shed). This will physically interface with the east wall of the Locomotive Workshops and it is proposed to improve the state of repair of this wall and its visual attractiveness for this occasion. This is also seen as an opportunity to improve the public perception of the building and attract people to the project. The development of Innovation Plaza includes areas of industrial surfaces (concrete) at the northern end and in the centre. At the northern end the SRA will reinstate the recently cut off rail link allowing for the exhibit of special trains , etc. In the centre a new track will be laid between the two workshops (at a higher level than the existing because of altered floor levels). The ATP hopes to exhibit an early steam crane train (originally from the ELW) on these rails.

DA 01

STATE RAIL AUTHORITY LAND

EXISTING PEDESTRIAN TUNNEL TO REDFERN STATION (PLATFORM 10 UPGRADED)

PROPOSED PEDESTRIAN/CYCLE LINK VIA UPGRADED EXISTING RAMP

EXISTING SRA ACCESS EASEMENT MAINTAINED (SHOWN DOTTED)

MARIAN STREET

ATP STATION LE
- ENTRY SIGNAGE &
- DECORATIVE CLAY

SHRUB/HEDGE SCREEN PLANTING TO BOUNDART

SRA TURNING CIRCLE EASEMENT (SHOWN DOTTED)

EXISTING AGSE BUILDING

EXISTING HISTORIC WATER TOWER

EXISTING TRAIN CARRIAGE
- POTENTIAL CAFE LOCATION
- PERMANENT SHADE CANOPY OVER

MANAGER'S PLAZA
- TERRACED SITTING AREA
- DECORATIVE CLAY BRICK PAVING
- SIGNAGE & ORIENTATION

EXISTING TANGARA WORKSHOP

EXISTING LOCOMOTIVE WORKSHOP

SUNKEN COURT
- DOUBLE ROW OF PLATANUS ORIENTALIS
- DECORATIVE CLAY BRICK PAVING
- CAFE TERRACE
- REMOVABLE SHADE UMBRELLAS
- REMOVABLE TABLES & CHAIRS

EXISTING RAIL LINES RETAINED

10 TEMPORARY VISITOR CAR SPACES

INNOVATION PLAZA

EXISTING NATIONAL INNOVATION CENTRE

EXISTING MATURE FIG RETAINED

MARGARET STREET

EXISTING ERECTING SHOP

8.0M WIDE SRA EASEMENT (SHOWN DOTTED)

PROPOSED RELOCATION OF STEAM CRANE

3.0M WIDE PEDESTRIAN FOOTPATH

TEMPORARY EXHIBITION AREA
- INDUSTRIAL ARTEFACT FOCAL POINT
- DEMOUNTABLE DISPLAYS
- SPECIAL LIGHTING
- REMOVABLE SHADE STRUCTURES
- POWER SUPPLY POINTS

FUTURE STREET TREE PLANTING ALONG CORNWALLIS STREET

1.8M HIGH FENCE TO TOP OF RETAINING WALL

5 TEMPORARY VISITOR CAR SPACES

RELOCATED CONCRETE TURNTABLE PAVING FEATURE

CORNWALLIS STREET

LOCOMOTIVE

STREET

GROVE OF NATIVE TREES TO ENCLOSE INNOVATION PLAZA FROM SOUTHERLY WINDS

LOCOMOTIVE STREET ENTRY
- ENTRY SIGNAGE & ORIENTATION
- MEDIAN PLANTING OF ADVANCED WASHINGTONIA ROBUSTA (COTTON PALM)
- EXISTING WIRES & FLAGPOLES RETAINED

BOUNDARY STREET

LEGEND
- SCOPE OF DEVELOPMENT A
- DECORATIVE DRY-PRESSED
- DECOMPOSED GRANITE GRA
- BITUMEN
- IN-SITU CONCRETE SLAB

PLANT SCHEDULE

STREET TREES & ADVANCED SPECIMEN TREES

NATIVE TREES

NATIVE SCREEN PLANTING

GROUNDCOVERS

MITCHELL WAY
- MAJOR PEDESTRIAN/CYCLE LINK
- RESTRICTED VEHICULAR USE (REMOVABLE BOLLARDS EACH END)
- AVENUE PLANTING OF ADVANCED GLEDITSIA 'SHADEMASTER'
- DECORATIVE CLAY BRICK PAVING
- POLE TOP LIGHTING
- RAISED INTERSECTION TO SLOW TRAFFIC

GAROEN STREET ENTRY
- MAJOR VEHICULAR/PEDESTRIAN CYCLE ENTRY TO THE ATP
- ENTRY SIGNAGE & ORIENTATION
- MEDIAN PLANTING OF ADVANCED *WASHINGTONIA ROBUSTA* (COTTON PALM)
- AVENUE PLANTING OF ADVANCED *GLEDITSIA* 'SHADEMASTER'
- SITE FOR PROPOSED SECURITY KIOSK

EPHEMERAL WATER FEATURE
- STORMWATER ENERGY DISSIPATER INCORPORATED INTO LANDSCAPE FEATURE
- GRASSED VIEWING TERRACES

LINEAR TREE PLANTING FORMS AN EDGE TO OVAL & SHADES WESTERN FACADE OF FUTURE BUILDING

FUTURE PEDESTRIAN LINK TO ADJACENT DEPARTMENT OF HOUSING DEVELOPMENT TO BE PROVIDED AS ADJACENT DEVELOPMENT PROCEEDS

PROPOSED CHILD CARE CENTRE

CENTRAL AVENUE

TANGARA STREET

SPECIMEN TREE *FICUS MACROCARPA* (MORETON BAY FIG)

SHARED PEDESTRIAN/CYCLE PATH

OVAL ENCLOSED BY ADVANCED *FICUS MICROCARPA* var 'HILLII' (HILL'S WEEPING FIG)

GRASS SPECTATOR TERRACES

TEMPORARY NATIVE TREE SCREEN PLANTING

BASKETBALL/MULTI USE BALL COURT

TENNIS COURT

PEDESTRIAN LINK TO BE PROVIDED AS ADJACENT DEVELOPMENT PROCEEDS

POLE TOP PEDESTRIAN LIGHTING

FUTURE PEDESTRIAN LINK

POCKET PARK

POCKET PARK

EXISTING MATURE POPLARS RETAINED

HENDERSON

EXISTING HENDERSON ROAD FOOTPATH TO BE RETAINED

PRACTICE BALL COURT

FUTURE PEDESTRIAN LINK

INFORMAL SPORTS OVAL (RETENTION BASIN)

BRIDGE LINK

GARDEN

EXISTING NORFOLK ALONG HENDERSON ROAD MAINTAINED

FUTURE STREET TREE PLANTING ALONG GARDEN STREET

EXISTING ALEXANDRIA HOTEL

HENDERSON ROAD PUBLIC ENTRANCE
- PEDESTRIAN/CYCLE ENTRY
- SPECIMEN TREES - *FICUS MACROCARPA* (MORETON BAY FIG)
- SEATING AREA
- ENTRY SIGNAGE & ORIENTATION
- EMERGENCY VEHICLE ACCESS TO OVAL

MITCHELL ROAD

0 5 10 15 30 50 metres

AUSTRALIAN TECHNOLOGY PARK, EV

JUNE 1996: PUBLIC DOMAIN V

AUSTRALIAN TECHNOLOGY P
SYDNEY LIMITED

PUBLIC WORKS

Prepared for AUSTRALIAN TECHNOLOGY PARK
CITY WEST DEVELOPME
PLANNING

Prepared by D C M

BENTHAM PL
CONNELL TO
WARDWELL TO

Plan 4. 3: Plan of Public Domain Works.

The ATPSL proposes to take up the Locomotive Workshops progressively and envisages a range of uses. These will change with time depending on market needs therefore flexibility is important. It is also preferred to maintain a through link lengthways and to the NIC. The ATPSL proposes uses for the building as follows:

Bays 1 - 4

- Bays 1 & 2 for display of machinery which would be cleaned and repaired (but not to look like new) interpreted via small TV monitors adjacent to the equipment, viewed via roped off areas or walkways and with the machinery having the potential for operation.
- Restrict Art Metalwork, or similar operation, to one bay.
- Discussions with Hunter Valley Training Corporation with a view to them working and carrying out training on the equipment.
- Bays 3 & 4 as a Science Centre - a changing exhibition of developing technology, possibly in enclosures within the space which could provide a controlled environment, eg. vibration, noise control.
- Consider relocating machinery stored in bays 3 & 4 to its original bays for display.

Bay 4a

- School of the Future in collaboration with the Department of Education - Supported by current minister.
- Proposed to be 4 classrooms with leading edge technology run by trained staff located on site. To operate by Year 11, 12 classes coming from other schools for periods of 1 or 2 weeks to be trained on site or for training teachers. Computer links etc. to visiting schools are envisaged.
- Normal classroom facilities required but with more electrical and communications facilities required.
- Installation of an additional floor envisaged.

Bays 5, 6 and/or 7

- TAFE Higher Skills Training Centre which is envisaged to be like the Lidcombe facility with high technology manufacturing equipment. This would be a training centre with the capacity to make components, such as for pilot projects.
- Requirements will be an industrial environment with equipment on a smooth floor. A classroom will be required, limited plumbing and a more extensive electrical installation
- In conjunction with this may be a 'Just in Time learning Centre' which would largely be a computer resource accessed by the community for courses, etc..

Bay 7

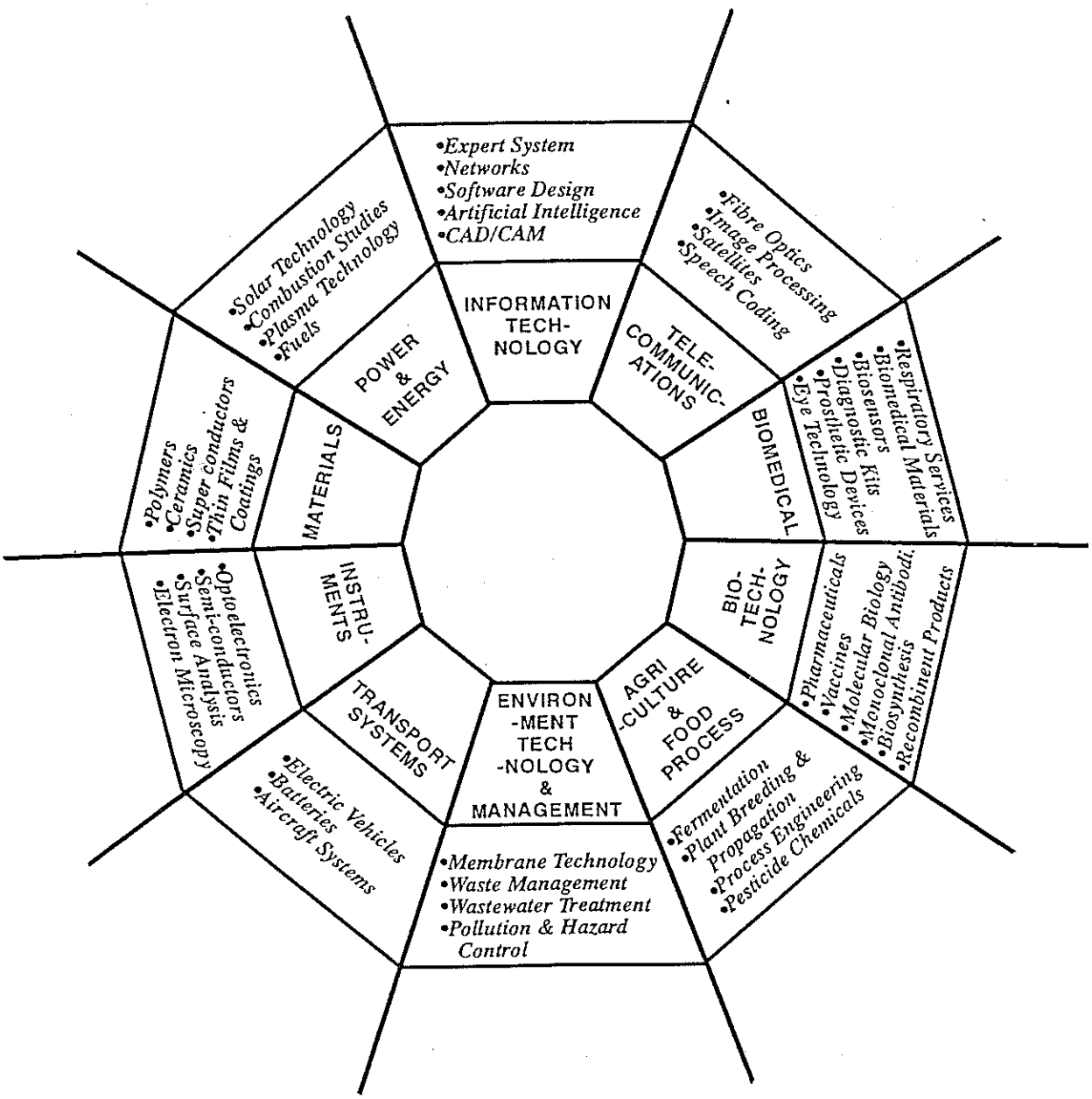
- Advanced Manufacturing Technology Facility to assist industry in embracing, taking up, best technology by providing an advisory service and demonstrating how technology is best used.
- Supported by Commonwealth Department of Industry, Science & Technology.

Bays 8 - 15

- Exhibition Centre of Advanced Technology to house a permanent but changing exhibition of applied technology (ie. ready to buy).
- Exhibition in large open space and offices, smaller exhibits in smaller spaces of Bays 14 & 15.

Funding is in place for some of these proposal but not all and they are also linked to the progressive development of the site and the success of the AGSEI & NIC.

Illustration 3. 1: Research areas proposed for the ATP.



6.5 CONSERVATION PROCESS OPTIONS

The Burra Charter outlines a range of approaches which can be taken to conservation. These are *maintenance, preservation, restoration, reconstruction* and *adaptation.* These terms have particular usages in relation to heritage conservation which are defined in Section 2.5. Each of the processes involves a greater or lesser degree of change. These processes in practice are generally applied in combination but the appropriate process should be chosen depending on the nature and condition of each item and on why it is significant.

In this case the policy recommended involves the preservation and repair (restoration and reconstruction) of the place to protect the physical fabric; adaptation to facilitate continued compatible use and subsequently a maintenance program / policy.

The appropriate processes are identified in detail in Section 6 in relation to conservation policy and in the recommendations of the inventory.

7. CONSERVATION POLICIES & RECOMMENDATIONS

7. CONSERVATION POLICY & RECOMMENDATIONS

7.1 INTRODUCTION

The recommended policies are set out in italics. In each policy area the major policy is contained in a box and this is followed by sub-policies. The policies are preceded by the information on which they are based. Alongside the policies are comments and references to the Articles of the Burra Charter and the Planning Instruments or other studies that fundamentally underpin many of the policies. The policies are presented as follows;

7.2 SITE POLICY

Schwager Brooks and Partners prepared a Conservation Policy for the Eveleigh Precinct in March 1994 for the Department of Planning. The report provides guidelines to direct conservation management over the whole precinct, including management, security, maintenance and adaptive re-use. Following are the criteria presented in that report which identify the basic conservation tenets which are required to be met.

Retention of Significance Criteria
Long term conservation of the outstanding cultural significance of the Eveleigh Precinct should be an important component of future use and management strategies.

Integration of Conservation Criteria
Conservation and re-use of the identified significant items should take place within the context of the development and future use of the Eveleigh precinct.

Management of Heritage Assets Criteria
Conservation of the significant items at Eveleigh should be undertaken in recognition of the asset value represented by the existing structures and equipment, in addition to their cultural qualities.

Progressive Conservation Criteria
Conservation of significant building fabric and machinery should take place progressively as part of planned programmes.

Conservation Processes Criteria
Conservation activities and processes at Eveleigh should be undertaken in accordance with the principles of The Burra Charter issued by Australia ICOMOS. These are the accepted national standards for conservation practice.

Conservation of Building Fabric Criteria
Extant building fabric, both internally and externally , from a range of periods, should be selectively conserved to illustrate the development and growth of the complex.

Conservation of Equipment Criteria
The equipment at Eveleigh which relates to the long term operation of the place as a major railway workshops complex should be conserved.

Conservation of Archaeological Resources Criteria
The procedures established by the NSW Heritage Act must be complied with for any item defined as a relic under the Act.

Development of vacant land within the Eveleigh precinct should take into account the potential for archaeological resources.

The exploitation of an archaeological resource should be guided by the nature of the work that causes its disturbance and, secondly, the environment to which it could contribute as part of an in-situ resource.

General Use Constraints Criteria
The introduction of new uses at Eveleigh, should be managed and guided to protect the essential heritage qualities of the identified buildings and machinery.

Interpretation Criteria
Conservation of significant buildings and equipment at Eveleigh should be combined with the interpretation of railway and engineering history as it relates to the historical role of the Eveleigh precinct. Interpretive themes and activities, or the establishment of museums or related operations, that have no linkages with Eveleigh Workshops, the general precinct or the NSW railways system are not recommended.

Public Access Criteria
Public access to the various areas of the precinct and to individual buildings should be consistent with the interpretive and functional roles established for each component.

A balance should be achieved between the desire for access to the historic buildings by the public and the requirements for privacy, confidentiality and security of ATP occupiers.

Curtilage Criteria
The historic buildings should be clearly visible from key points within the ATP site to assist with them being fully integrated with the new facilities.

Maintenance and Security Criteria
Minimum levels of maintenance and security should be established to retard the forces of active deterioration in the period until new service life is provided to buildings which are currently inactive.

Adequate security should be maintained over the equipment in Bays 1-4A at all times to prevent recurrent vandalism and theft.

Ordinance Compliance Criteria
Approaches to compliance with building ordinances for the conservation and re-use of individual buildings should focus on creative solutions which respond to the spirit and intent of the ordinances if strict compliance to particular criteria would adversely affect significance.

Intervention Criteria
Intervention into the building fabric for non conservation purposes should generally be restricted to approved programmes for re-use.

Qualified Staff Criteria
Appropriate conservation skills should be available within project teams assembled to deal with the historic buildings.

Review of Conservation Policies Criteria
The Conservation Policies and the detailed guidelines that support them should be regularly reviewed, approximately every five years.

Criteria for the Conservation of the Locomotive Workshops
The original architectural integrity, spatial drama and structural integrity of the Workshops should remain capable of interpretation.

Evidence of past industrial operations, including the overhead cranes, should be retained for interpretation wherever possible, but particularly in Bays 1-4A and the early annexes along the southern elevation.

The collection of significant equipment and machinery, the majority of which is currently in Bays 1-4A of the Locomotive Workshop, should be conserved in ways which protect its cultural significance, continue its useful life and contribute to the activities at Eveleigh as both an engineering and educational resource.

7.3 ELW - GENERAL POLICY

This policy has been written as part of the Conservation Plan for the Eveleigh Locomotive Workshops. Some of these policies affect the Site Policy written by Schwager Brooks and summarised in Section 7.2. The site policy needs to be reviewed in relation to the policies for the Workshops.

7.3.1 Generally

Policy 7.3.1
Conserve and develop the Eveleigh Locomotive Workshops, including machinery, in accordance with the Conservation Plan.

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 7.3.1.1
Conserve and develop the ELW in accordance with the principles of the Australian ICOMOS Charter for the Conservation of Places of Cultural Significance (Burra Charter)

Illustrated Burra Charter 1992

Policy 7.3.1.2
This Conservation Plan and Statement of Significance should be accepted as one of the bases for future management of the Workshops.

Section 5 of this report

Policy 7.3.1.3
Retain and enhance the heritage significance as set out in the statement of significance in any conservation and development activity.

Burra Charter Article 2

Policy 7.3.1.4
Consider the place as a whole, that is, the building, machinery and its setting.

Burra Charter Article 5

Policy 7.3.1.5
The contents, especially the signicicant machinery, should remain in-situ and be conserved.

Burra Charter Article 10

Policy 7.3.1.6
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 & 21

Policy 7.3.1.7
Carry out urgent works.

See 8.1

7.3.2 Management

Policy 7.3.2
Set up management structures and identify individuals to manage and execute the conservation of the ELW.

The effectiveness of the Conservation 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. These policies cover management structures and mechanisms. They refer to the Eveleigh Locomotive Workshops Steering Committee (ELWSC) in an overseeing role. If this does not continue some other overseeing body needs to be established. However conservation management should be pursued as an active day-to-day responsibility. It is not adequate to have a committee in a conservation management role and it should be the active responsibility of an appropriately skilled person.

Policy 7.3.2.1

This Conservation Plan should be adopted by the Eveleigh Locomotive Workshops Steering Committee, the CWDC, and the ATPSL (the major tennant).

ATPSL responsibible overall for adopting CP & policies, seeking approvals.

Policy 7.3.2.2

Obtain endorsement of the Conservation Plan from the Department of Urban Affairs and Planning and the Heritage Council prior to any works being carried out.

REP 26.

Policy 7.3.2.3

Set out a clear structure showing responsibility for management and for the care of the ELW and make it available to all persons involved (including telephone numbers or contact points).

Burra Charter Article 25

Policy 7.3.2.4

An appropriately skilled individual should be responsible for care and management, giving practical advice and making decisions. Integrate the role into the management structure and as a regular (eg. full-time or part-time each week), on-site position on an on-going basis, reporting to the ELWSC or other overseeing committee.

Eg. a conservation architect

Policy 7.3.2.5

Maintain an overseeing role by the ELWSC or other committee whose on-going role is ensured by the DUAP. The membership should include appropriate expertise as required such as a conservation architect and/or an industrial archaeologist and the National Trust should be kept informed as appropriate. The major tennant should request meetings of the ELWSC when required.

Policy 7.3.2.6

Integrate development and conservation work, and care and management for the Master Planning area and for the Eveleigh Precinct as a whole, particularly between the SRA, CWDC, ATPSL, DUAP and the South Sydney City Council..

Policy 7.3.2.7

Submit a Development Application in accordance with the REP to the DUAP for all major development works, with the exception of recurrent maintenance and urgent works already approved. In the future, formally identify works which are exempted from the REP. Submit an excavation permit, as appropriate, with a DA.

REP.26. Heritage Act.

7.3.3 Use of the Conservation Plan

Policy 7.3.3
Apply this Conservation Plan during development and conservation works and complete and develop the Conservation Plan.

The conservation plan provides policies to guide decision-making and development. It also provides practical information to guide documentation of works, in particular the building fabric inventory. The inventory should be completed to guide future work. The conservation plan meets the requirements of the REP for submission with development applications. It also serves as a reference document for historical and physical information about the building.

The Conservation Plan needs to be regularly reviewed, both over time and to include new information, in order to remain relevant. New information may include further historical research, social history research, information from former machine operators, and archaeological findings.

Of necessity the document uses jargon and is too bulky for on site use. A short manual or pamphlet ('Carer's Guide') should be prepared summarising key points in laymen's terms and which is suitable for issue to site workers or users. It should provide contact information for approvals or advice.

Policy 7.3.3.1
Development Applications should address the Conservation Plan.

REP 26

Policy 7.3.3.2
Lodge copies of the completed Conservation Plan with a public library and with the stakeholders in the site and make it readily accessible by the public.

Policy 7.3.3.3
Complete the building fabric inventory, addressing the significance, condition and recommended works for each element.

Policy 7.3.3.4
Prepare a 'Carer's Guide', in lay terms, and make it readily available to inform all those involved in working on the place.

Policy 7.3.3.5
Review the Conservation Plan every five years and when required to take into consideration any new information.

See policies 7.3.3.6 and 7.3.11

Policy 7.3.3.6
Carry out in the medium to long term, the further research identified in this plan and including social and oral history and a conservation plan for the whole precinct.

See Section 2.8 and Policies 7.3.11. . Note that an oral history study and machinery study is currnetly being commissioned by CWDC, DUAP & SRA.

7.3.4 Setting of the Eveleigh Locomotive Workshops

Policy 7.3.4
Retain the industrial/railway setting of the Eveleigh Locomotive Workshops.

The association of the workshop to the railway system is basic to its original development and use and crucial to the significance, understanding and interpretation of the place. It is an industrial cultural landscape and this should not be obscured to give the place a 'heritage' or other character it never had. It should be noted that the SRA is proposing a Heritage and Cultural Precinct in the area of the Eveleigh Carriage Workshops (on the northern side of the main rail line) and that a major overbridge building is planned over Redfern Station which will be physically linked to the ATP.

Policy 7.3.4.1
Retain the large scale industrial railway character of the ELW.

Policy 7.3.4. 2
Maintain an appropriate visual setting, eg., new construction within the site should not adversely affect the setting and should address the form, scale, colour texture and materials of the existing.

Burra Charter Article 8

Policy 7.3.4.3
Maintain the existing rail link to the railway system and retain evidence of former links, eg. through doorways on all sides, to lines on the south side and to the traverser 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, especially out of context, is not recommended.

Burra Charter Article 9. Note that approval has already been given to the relocation of the turntable at the SE corner of the ELW.
See Plan 2.5, page 26

Policy 7.3.4.4
Consider retaining the traverser in situ in a section of its trench to demonstrate the links to buildings to the west.

Policy 7.3.4.5
The rail lines and turntables south of the building should remain in situ and major new development should be located south of these lines.

UDP 6.2.3

Policy 7.3.4.6
Do not use street furniture, such as bollards, seating, lighting as well as paving, to create a "heritage" look, ie. an inappropriate historic appearance the place never had. Street furniture should be in keeping with the large scale industrial character of the precinct. Railway related detailing with industrial finishes, simple modern design is recommended. Such detailing should be designed for the site, ie. be site specific.

Policy 7.3.4.7
Design appropriate new signage so it does not detract from the visual character of the area.

7.3.5 Maintenance

Policy 7.3.5
Preserve the Eveleigh Locomotive Workshop by stabilisation and continuing maintenance.

These policies recognise that maintenance is an important conservation process. A long term Maintenance Plan should be developed and coordinated with the management and usage of the place. For example, general clearing of the drains can be integrated with regular cleaning of the place. The Maintenance Plan should be subject to regular review.

Policy 7.3.5.1

Preserve the building (in the short term) by stabilising deterioration including making watertight, structurally stable and adequately disposing of stormwater.

Policy 7.3.5.2

Preserve the building (in the longer term) by continuing maintenance, the singlemost important process of conservation.

Policy 7.3.5. 3

Prepare a Maintenance Plan for the ELW. It should include regular inspections, outline who is responsible for various aspects of it and allow for prompt follow-up maintenance and repair if required.

Burra Charter Article 2.

Policy 7.3.5.4

Commit ongoing and adequate financial resources to the development and implementation of a Maintenance Plan.

Burra Charter Article 2

Policy 7.3.5. 5

Regular inspections and maintenance, shall 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 27

7.3.6 Compatible Uses

Policy 7.3.6
Ensure the conservation of the ELW by adapting the place to a compatible new use.

Finding new uses for the place is vital to its conservation. An empty building is subject to vandalism and neglect. Uses should be compatible and some uses enhance significance. Adaptation can build on the buildings features, for example the proposal to use the 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.

ATP Masterplan 1994

Policy 7.3.6.1

The future use of the place should be compatible with its significance. Compatible uses retain or regain significance, require minimum intervention in the fabric, enhance the industrial character and would include uses relating to railways or industrial workshops. It is desirable that public access and interpretation can be accommodated.

Burra Charter Article 7

Policy 7.3.6.2

New uses should enhance the industrial character of the place. Present levels of finishes of the existing fabric are to be maintained..

Policy 7.3.6.3

The preferred option for the use of Eveleigh Locomotive Workshops, is as a productive, heavy engineering workshop associated with the railwa. This may be in whole or in part but particularly applies to the first four bays. 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

Policy 7.3.6.4

Make only the minimum necessary adaptation to accommodate the new use while taking into account the Cultural Significance.

Burra Charter Article 20 & 21

Policy 7.3.6.5

Use the existing features of the building in the adaptation to enhance the buildings existing spatial qualities and character.

Burra Charter Article 20 & 21

7.3.7 Design of New Work

Policy 7.3.7
Design new works required for adaptive re-use so the heritage significance is retained.

New work will be required to adapt the place to new uses. Much of the new work associated with the place has failed because of its poor quality and now detracts from the place. New work should be comparable with the old in quality. It should not dominate the existing structure and should generally be within its 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 7.3.7.1
New work or changes are to be compatible with the heritage significance of the place, ie. minimise impact, be distinguishable from the original, and be reversible.

Policy 7.3.7.2
Match the excellence of the original in the quality of design and construction of new.

Policy 7.3.7.3
Reflect the original design concept in new work. The existing building is to be a starting point for the design of new work.

Policy 7.3.7.4
Utilise new work, where ever required, as an opportunity to enhance or recover the building's significance.

Policy 7.3.7.5
Locate new structures south of the existing building or within the building envelope and reflecting the place's internal planning. New construction should address but not mimic the existing in terms of scale, materials, colour, texture and quality.

Policy 7.3.7.6
New design and conservation teams are to work together from initial stages through to design and construction

7.3.8 Building

Policy 7.3.8
Conserve the building as a whole and conserve significant building fabric.

Maximising the survival of original fabric is important to keep the building's authenticity and integrity. If there is a choice available existing fabric should be retained, eg. do not generally strip back the walls for painting, rather paint over, repair of embedded downpipes should 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.

See Section 7.4 for detailed building policies.

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. This is desirable as it continues the tradition at the site and builds the skillbase for future works at ELW.

Policy 7.3.8.1

Conserve significant existing fabric by repair and preservation. Individual elements should be conserved according to their significance and as recommended in the Inventory.

Policy 7.3.8.2

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 and repair and preservation is to have priority.

Burra Charter Article 17

Policy 7.3.8.3

Consider all aspects of ELW's Cultural Significance without unwarranted emphasis on any one aspect or stage of its development.

Burra Charter Article 5 & 16

Policy 7.3.8.4

Annexes should be considered 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 moderate significance.

Policy 7.3.8.5

Prioritise conservation action according to conservation needs. Address unstable fabric or deterioration which endangers significant fabric first.

Policy 7.3.8.6

Carry out and supervise any work only by appropriately skilled tradespeople or professionals, for example, a conservation architect for project control on technical matters, banker masons for stonework, skilled bricklayers for brickwork, specialised machine fitters for machinery. Proof should be sought of their skill level. Apprentices and tradespeople should be trained in higher skills where appropriate during works.

Burra Charter Article 27

Policy 7.3.8.7

Employ traditional techniques in conservation work, but in some circumstances 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

Policy 7.3.8.8

Materials from sections of the building may be used to repair other parts of the building. Matching old materials from other sites, for example Prince Alfred Sidings, may be used in repairs. New materials can be used if available or made to match, for example cast iron windows.

Note that SRA has approved the use of ex PA sidings materials fir the Carriage Workshops.

Policy 7.3.8.9

If existing significant fabric has to be removed, for example in order to repair the structure, or to reveal aspects of the building's significance, it is to be recorded before any intervention is to take place and if applicable, a sample retained on site. Intrusive elements should be removed.

Burra Charter Article 23

Policy 7.3.8.10

Carefully stockpile any existing fabric removed from the structure and appropriate for re-use for future use. Protect from the elements, termite attack and ground moisture, salts and theft.

Policy 7.3.8.11

Repair and replace original fabric temporarily removed, eg. timber doors, as soon as possible to ensure its security.

Policy 7.3.8.12

In the long term, remove intrusive elements which detract from the heritage significance of the place.

See Section 5.6, page 114.

7.3.9 Machinery

Policy 7.3.9
Conserve significant machinery assemblages, collections and systems in situ and according to individual conservation plans.

The Cultural Significance of the place is linked with its past use as an operating workshop. The ability of the Workshops to demonstrate its technological attributes 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 systems. This is a unique feature of the Eveleigh Locomotive Workshops. To make systems operational it may be appropriate to operate them on a different power source eg. the boilers on gas, rather than coal, to enable the steam power to operate The relationship between the various items of machinery and tools demonstrate important aspects of their operational use and this evidence is lost if the relationship between the items is broken.

See Section 7.5 for detailed machinery policies.

Policy 7.3.9.1
The machinery and associated tools are to remain together and in situ as assemblages, collections or systems.

Policy 7.3.9.2
Machinery and power systems are to remain or be made operational.

Policy 7.3.9.3
The moving of any machinery significant to the Eveleigh Precinct, including associated tools, from the Locomotive Workshops is unacceptable unless it is the sole means of ensuring their survival.

Burra Charter Article 9

Policy 7.3.9.4
Any users of the machinery must understand its significance and must not make any adaptation or change without reference to the Conservation Plan and without consulting an Industrial Archaeologist or machinery conservator.

7.3.10 Intervention

Policy 7.3.10
Do not intervene in building fabric or machinery for non-conservation purposes unless unavoidable.

This section refers to intervention for non conservation purposes.

Policy 7.3.10.1
Only undertake investigation of the building fabric or machines which requires physical intervention if necessary and unavoidable. eg., inspection of footings or downpipes, or the inspection of cylinders or gear boxes. Keep interventions to a minimum.

Burra Charter Article 24

Policy 7.3.10.2
Minimise intervention for non conservation purposes and record the existing fabric before any intervention in the place.

Article 23

Policy 7.3.10.3
Temporary users of the place must understand the significance of the site and act responsibly minimising intervention in the fabric.

Policy 7.3.10.4
Intervention for archaeological investigation, other than associated with conservation and re-use, must only proceed on the basis of an explicit proposal from a skilled professional and an excavation permit under the Heritage Act, 1977, must be obtained.

7.3.11 Interpretation

Policy 7.3.11
Allow access and interpret the place to the public as a railway workshop.

The place should continue to be 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

Policy 7.3.11.1
Prepare an interpretive plan that discusses the themes and the ways in which these themes can be interpreted.

Policy 7.3.11.2
Interpret the use of the place as a railway workshop on the site and allow public access to interpret the site, within the limits of security required for commercial operations and physical security..

Policy 7.3.11.3
Use further research eg., on social history, to interpret the site.

Policy 7.3.11.4
Establish a facility on site to enable the recording of and access to social history information, eg. as part of an interpretive facility.

See Policy 7.3.3.6

Policy 7.3.11.5
Produce a guidebook to the place, in the long term.

7.3.12 Archaeology

Policy 7.3.12
Leave archaeological relics in situ and adopt strategies for development that aviod archaeological remains.

The current philosophy regarding the conservation of archaeological relics is that they are best conserved by remaining undisturbed. New work such as servicing should be located to avoid known remains

Policy 7.3.12.1
No archaeological excavation is required of the site unless relics need to be disturbed for other work.

Policy 7.3.12.2
Where possible archaeological relics are to remain in-situ.

See pages 65 & 102.

Policy 7.3.12.3
During construction works, avoid disturbing known sites of archaeological remains.

Policy 7.3.12.4
If works in the vicinity of remains is unavoidable or remains of significance are unexpectedly disturbed, an appropriately skilled archaeologist should be engaged and an archaeological permit must be obtained.

Heritage Act, 1977

7.4 ELW BUILDING POLICY

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.

7.4.1 Generally

Policy 7.4.1
Complete recording and inventory and rectify stormwater collection and disposal as soon as possible.

Policy 7.4.1. 1
Complete the detailed building fabric inventory as a basis for documentation and review the policies and recommendations in the light of the detailed survey.

Policy 7.4.1.2
Make the building watertight and rectify stormwater disposal as soon as possible, but following the development of a long term strategy (including financial) and a clear understanding of the integrated nature of the whole building.

Policy 7.4.1.3
Undertake detailed recording, including photographic, measured details and video, prior to commencement of major works. If possible, make a video record of the interior and exterior by an experienced team, with identification and location recorded visually and/or orally

Note: film may be more stable than video

7.4.2 Investigation and Testing

Policy 7.4.2
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.

Policy 7.4.2.1
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. Carry out investigation by relevant conservation consultants (such as an industrial archaeologist, conservation architect, metallurgist, scientific laboratory, etc.) with assistance from the Heritage Council's Technical Advisory Group on Materials Conservation (TAGMAC). Investigation is to include:

- ***roof and cast iron gutters***
- ***settlement, condition of timber piles***
- ***embedded downpipes, expose and test***
- ***removal of a cast iron window to examine condition and nature of fixing lugs and to provide a model for new castings.***
- ***brickwork, nature of deposits, salt contamination***
- ***iron finishes, for corrosion protection and aesthetic reasons***
- ***paint, composition and colour***
- ***termite damage***
- ***corrosion of metals***
- ***stability of gable brickwork***
- ***drains at columns***

Policy 7.4.2.2
Test techniques for repair on site before final methods are selected. Test panels should not be in prominent locations. Tests are to include:

- ***brick and stone cleaning***
- ***repointing***
- ***bricklaying***
- ***epoxy patching of stone and wood***
- ***rust treatment, preparation of cast iron frames***
- ***painted finishes***
- ***patching methods generally***
- ***cast iron reproductions***

7.4.3 Structure

Policy 7.4.3
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. The major cracks should be monitored to confirm that movement/subsidence has halted before repairs are undertaken. 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 7.4.3.1
Assess structural defects in detail and physically monitor by an engineer for continuing movement, extent of movement and to devise repair strategies. This includes:

- ***North-east corner for subsidence and steel lintel in Row 15***
- ***Gables, southern end of Bays 1-4***
- ***Columns which have subsided.***

Policy 7.4.3.2
Stabilise structure if it is found to be moving prior to carrying out extensive fabric repairs.

Policy 7.4.3.3
Assess the building, especially parapets, for earthquake stability and consider tying in parapets as part of conservation works.

7.4.4 Roof

Policy 7.4.4
Conserve roof form and significant fabric, make watertight and rectify defects and maintain regularly.

Repairs to the roof have high priority to ensure watertightness but depend on the resolution of the problems of stormwater disposal. This need is regardless of end use. Analysis of the system and decisions on repair strategy can be made immediately or in the short term.

System

Policy 7.4.4. 1
Any future work to the roof is not to detract from the integrity of the structure and system.

Policy 7.4.4.2
Analyse the whole gutter, downpipe, underground stormwater system carefully before any works are undertaken.

Policy 7.4.4.3
Conserve the existing integrated water catchment and disposal system if possible. Only if this is not feasible are alternative techniques to be introduced.

Policy 7.4.4.4
Survey the roof to locate early fabric for preservation.

Policy 7.4.4.5
Preserve sections of original or early corrugated galvanised iron, including bolted fixings and flashings. Patching may be required.

Policy 7.4.4.6
Analyse deteriorated connections between gutters, trusses, columns and girders with the advice of a metallurgist.

Monitor roof louvres

Policy 7.4.4.7
Where original detail survives, eg. on Bay 2 monitor preserve it and reinstate missing elements.

Policy 7.4.4.8
Conserve the heavy gauge iron louvred sides through maintenance.

Roof Glazing

The original roofs had extensive areas of glazing below the monitor roofs. The configuration of this glazing remains only in Bay 15 west. In most bays the area of roof lighting has been greatly reduced and early photographs indicate that the original system provided a high level of natural light. A further advantage is that the location of the glazing close to the monitor means that heatgain through the roof lights was minimised by hot air being removed through the adjacent louvres.

Illustration 7. 1 Original configuration of glazing in bay 15 West.

Policy 7.4.4.9
Preserve Bay 15 West roof glazing and record to allow reconstruction elsewhere as detailed drawings have not been found..

Policy 7.4.4.10
Reconstruct the roof glazing in the original configuration if higher lighting levels are required throughout the building.

Gutters & Downpipes

The cast iron downpipes embedded in the brickwork in the east wall have the highest priority for repairs followed by cast iron gutters and other downpipes. These features are unusual and need to be carefully assessed to determine how to conserve them. The gutters can be inspected from crane rails and from scissor lifts, etc. when it is safe to do so and a section of roofing and gutter needs to be removed to allow detailed inspection and devise stabilisation and repair methods.

Policy 7.4.4.11
Make the stormwater system operational by repair and partial replacement as a matter of urgency.

Policy 7.4.4.12
Examine cast iron gutters in detail to assess condition paying particular attention to junctions.

Policy 7.4.4.13
Repair the embedded downpipes within the engaged piers if possible. It is acceptable to remove some bricks to assess the condition and detail whether this is possible and practicable.

Policy 7.4.4.14
If repair of the embedded downpipes is not possible and the roof stormwater is to be connected to downpipes external to the piers, existing downpipes are not be removed. Repair the brickwork and detail the rain water heads to exclude water from the existing pipes.

Trusses

The roof trusses are one of the most significant elements in the complex and require minimal intervention.

Policy 7.4.4.15
Conserve the roof truss system through maintenance. Monitor and treat corrosion if necessary, particularly at connections

Policy 7.4.5.10
Consider bricks from within walls as a source of replacement bricks if required for external walls, eg. to reconstruct openings on the east wall. Turning bricks may be appropriate in limited areas but is unneccessary on a large scale.

Policy 7.4.5.11
Materials, such as bricks, may be re-used from stockpiled former railway buildings where there is a match, for example, the former Carpenter's Shop and Blacksmith's Shop, Central Station, materials from which are planned to be stockpiled at Eveleigh (including east iron windows). Note that the SRA has approved the use of these materials in the Carriage Workshops.

Policy 7.4.5.13
Any new brieks required shall be reproduced to match both the 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. Assess the full extent of new bricks required to be made so that the quantity is large enough to interest a brick yard and to ensure an economical price.

7.4.5 Brick Walls

Policy 7.4.5
Repair brick walls, in particular the east wall, 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 and especially the east wall. The tendency to 'clean up' the walls should be limited by these policies and by those on cleaning (7.4.7). Retaining features such as flues and brackets contributes to the historical interpretation of the place. Extreme care will be required with repointing, 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..

Policy 7.4.5.1
Repair cracked brickwork to match the existing using lime mortar. Do not use cement.

Policy 7.4.5.2
Do not reface or coat the surface of the damaged east wall unless future investigation and testing reveals it is necessary.

Policy 7.4.5.3
Allow the wall to dry out after downpipes are repaired. Desalinate by washing, where required, prior to or as part of the process of repair..

Policy 7.4.5.4
Remove plant growth and treat with biocide according to specification and under supervision

Policy 7.4.5.5
Remove damaging rusted metal elements as identified in the building fabric inventory and patch holes using non-damaging techniques. Non damaging inserts and attachments should remain if they are interpretable.

Careful assessment is required in the building fabric inventory.

Policy 7.4.5.6
Main flues, hydraulic lines, fuel supply lines, etc. associated with the workshops function and located on the face of the building are not generally be removed. Monitor and maintain metal elements not removed.

Policy 7.4.5.7
Preserve the large metal brackets of the former monorail attached to the north and west walls.

Policy 7.4.5.8
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.

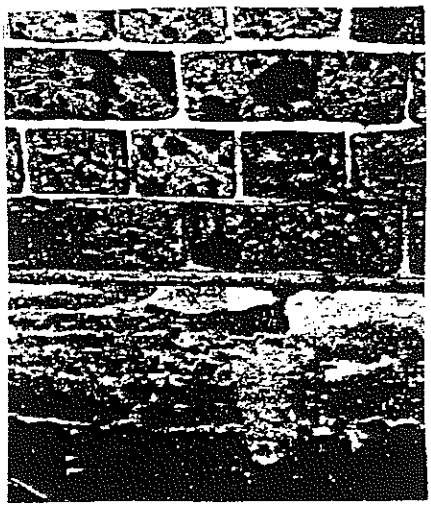


Illustration 7. 2 Asphalt damp proof course. PWD 1995.

Policy 7.4.5.9
Any repointing of the brickwork shall be a lime mortar to match existing.

7.4.6 Stonework

Policy 7.4.6
Assess and make safe parapet capping and cornice and repair or replace as necessary.

The stonework is integral with 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.

Policy 7.4.6.1
All replacement or repair work to the sandstone shall be carried out by a skilled stonemason under the guidance of a conservation architect.

Policy 7.4.6.2
The cornice and parapet capping are to be assessed by a conservation architect and a skilled mason and made safe.

Policy 7.4.6.3
Replace stonework only if unsound physically or structurally. The minimum necessary should be replaced.

Policy 7.4.6.4
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 from any quarry.

Policy 7.4.6.5
Stone may be repaired by epoxy patching, or other proven technique, rather than replacement, to restore function and appearance. Do not use cement. Patching must be tightly specified and supervised, and executed by skilled craftsmen.

The extent of patching versus replacement must be assessed carefully by a conservation architect and a stonemason.

Policy 7.4.6.6
Repoint open mortar joints and install over flashing if required to the stone cornices and parapet capping generally and rather than replacement if there is minor physical damage

The need for overflashing needs to be carefully assessed by a conservation architect and a stonemason.

Policy 7.4.6.7
Repair stone in situ, where possible. Where stones are removed, protect the wall below from water entry and replace with minimum delay.

Policy 7.4.6.8
Remove rusting steel inserts and patch in situ. Preserve cast iron toggles.

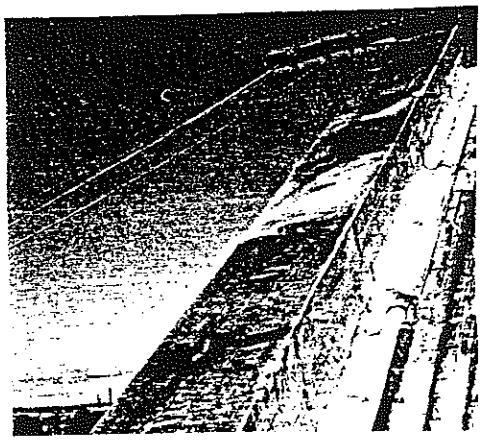


Illustration 7. 3. Cast iron toggles in parapet.

Policy 7.4.6.9
In specific limited areas, eg. the plinth in Row 15 of the East wall it may be acceptable to use concrete rather than extensive stone replacement which is not visible.

7.4.7 Cleaning

Policy 7.4.7
Clean building fabric carefully and only as necessary for conservation or removal of intrusive coatings.

Overcleaning of the east wall 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 7.4.7.1
Do not overclean.

Policy 7.4.7.2
Clean, using proven techniques, and only as necessary to remove damaging chemicals and pollutants or paint (eg. where accrections are removed) and to allow paint finishes, etc. to adhere to the walls.

Policy 7.4.7.3
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 7.4.7.4
Do not apply graffiti coatings or water repellent coatings to face brickwork and stonework.

7.4.8 Doors and Windows

Policy 7.4.8
Conserve, reinstate or reconstruct timber doors and cast iron windows as recommended in detail and limit insertion of new openings.

Windows

The majority of 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 where) 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. Openings to traverser bays are infilled with varying materials which are not of significance. Matching doors or windows, eg. from Prince Albert Sidings, may be available for re-use (note prior SRA commitment to Carriage Workshops).

Policy 7.4.8.1
Assess all windows in detail in the building fabric survey.

Policy 7.4.8.2
Preserve the existing surviving cast iron windows. Reconstruct missing windows, or elements of windows, with the assistance of a skilled foundry. Use of matching windows from other sites is acceptable, if available

Policy 7.4.8.3
Unbuild a cast iron window in order to investigate the fixing methods to provide easier installation and a model for casting.

Policy 7.4.8.4
Corrosion of windows are to be assessed by a metallurgist to determine appropriate treatment

Policy 7.4.8.5
Carry out as much work as possible in situ to minimise damage to brickwork by removal. If abrasive blasting is required to remove corrosion products the adjoining brickwork, including reveals must be physically protected.

Policy 7.4.8.6
Remove intrusive windows, as identified in the fabric survey, and replace with a reconstructed cast iron window. In some cases a modern but compatible window is acceptable.

Policy 7.4.8.7
Do not generally make new openings. On the ground floor any new openings should match the existing. On any upper level they should relate to the brickwork panels (as in Bay 15 south) and should not be in pediments.

Policy 7.4.8.8
Preserve the high level windows, located in the mezzanine area of Bay 15 as they contribute to the historical interpretation of the place.

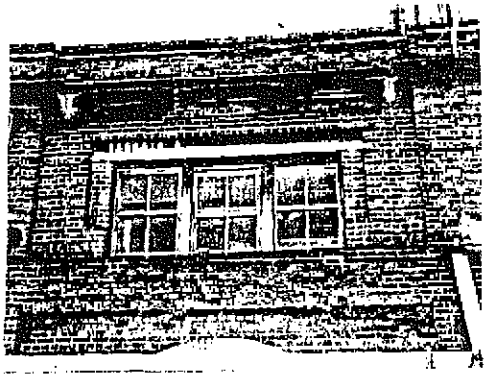


Illustration 7. 4. Windows to mezzanine in Bay 15.

Doors

Policy 7.4.8.9
Assess all timber doors and frames (in situ and stored) in detail as part of the building fabric survey. It may be appropriate to retain the corrugated iron cladding to some doors.

Policy 7.4.8.10
Conserve as many as possible of the original doors to allow for historical interpretation of the complex. This may require epoxy filling of some of the timbers.

Policy 7.4.8.11
Repairs are to be by a joinery shop skilled in restoration. Work includes taking apart and repairing the existing stored doors, where necessary, re-using all those timber sections that are sound, replacing ironmongery, repairing curved heads of frames and termite damaged frames.

Policy 7.4.8.12
Replicate missing elements of ironmongery, possibly at the Eveleigh Workshop.

Policy 7.4.8.13
It is recommended that the early ledged and sheeted door be reconstructed on the eastern facade

Policy 7.4.8.14
Locate new main entries in the traverser bays as the existing fabric is not of significance and the original doors do not survive.

Policy 7.4.8.15
New 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 may be retained as doors.

7.4.9 Interior

Policy 7.4.9
Conserve structure, spatial arrangements and character when adapting to new use and inserting new elements.

Through Link

The building plan originally had a central (rail)road in Row 8 which linked to the rail system. The major cross links where in the traverser bays, that is, Bays 7 & 13, though the traversers where removed in 1901 & 1922 respectively. Subsiduary 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 is recognised in the Master Plan, See Plan 4.2, which includes Row 8 as required pedestrian access and Bay 7 as a preferred pedestrian route.

Policy7.4.9.1
Retain Row 8 and Bay 7 as through links. In Row 8 retain the rail lines and preferably expose them.

Columns

The column grid is integral to the building and is one of the generators of the buildings form. Columns should not be removed and the grid should guide planning within the space. Planning should be 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 considered on a case by case basis. Some columns show evidence of subsidence.

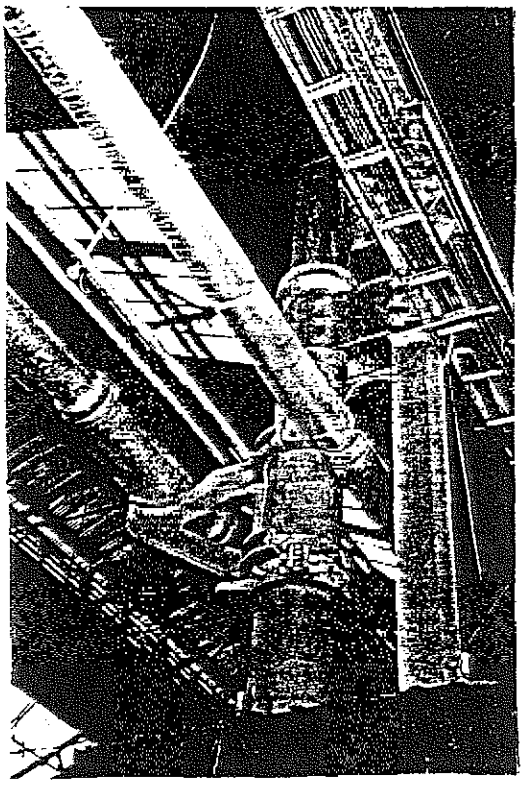
Policy 7.4.9.2
Jack up and support columns which have subsided, subsequent to receiving structural advice.

Policy 7.4.9.3
Preserve the column grid and columns.

Policy 7.4.9.4
Base new designs on the column grid.

Policy 7.4.9.5
Carry out further research before using columns (or walls) to support new loads.. Establish guidelines for structural and aesthetic attributes of such installations..

Illustration 7. 5 Bracket supporting low pressure return pipe (part of the hydraulic system) between Bays 1 & 2.



Girders and Crane rails

Girders and crane rails are an integral part of the structure and are important to its interpretation. Lifting as in Bay 5 north 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. However, it is preferable not to remove these girders as they indicate where the line shafting was located.

Policy 7.4.9.6
Conserve crane rails and girders in their original locations, ie mounted on the crane rails in each bay.

Policy 7.4.9.7
Use crane rails and girders to support new features, subject to consideration of the ability to provide structural support and aesthetic compatibility.

Floors and sub-floor spaces

The existing floors include a range of industrial finishes, from concrete to bare earth

Policy 7.4.9.8
Bays 1-4 are on piles. Heavy loads, such as earth moving machinery must not be applied close to the walls and columns.

Policy 7.4.9.9
Future work should retain the industrial historical character of Eveleigh Railway Yards by using industrial finishes.

Policy 7.4.9.10
Leave rails in situ, preferably visible, but if not practicable, protected before covering.

Policy 7.4.9.11
Do not remove remains of pits and machine footings in Bays 4a-15, now overlaid by a new floor.

Policy 7.4.9.12
Preserve below ground pipes, for example the air supply lines from the Rootes blowers in bay 1.

Policy 7.4.9.13
Protect below ground features when installing stormwater drains. Advice of an industrial archaeologist should be sought if in doubt.

Policy 7.4.9.14
Do not generally remove old pipes even if they are not currently working.

Mezzanines

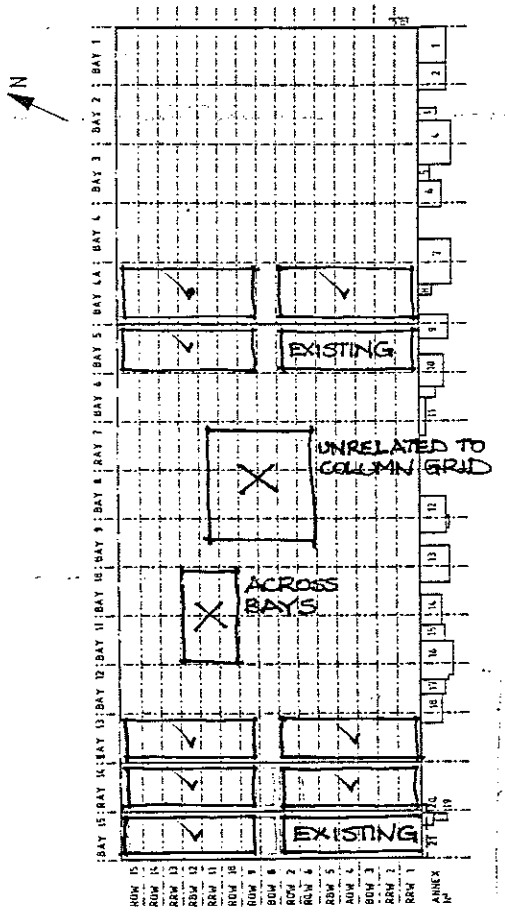
All existing mezzanines are additions but some have moderate heritage value. Mezzanines are a practical way to add more floor space to the building but interupt the large spaces and open character of the interior of the building. The existing ground level floor space should be used in preference to mezzanines and if they are necessary they should be designed and located to minimise impact on the open character, eg in Bays 4a, 5, 14 & 15 (that is where the space is subdivided by internal brick walls). Such alterations should be able to be removed in the future without damaging significant fabric.

Policy 7.4.9.15
Preserve the open character of Bays 6-13 and Bays 1-4. Retain the mezzanines in Bay 5 South and Bay 15 South, subject to their structural condition.

The mezzanine in Bay 5 & 6 North is intrusive and interupts the buildings structure.

Policy 7.4.9.16
If new mezzanines are unavoidable they are to minimise the interruption of the space allow the existing structure to be visible. They should run along bays (rather than across as in Bay 5&6N) so that the lattice girders and crane rails are not affected and to reflect the patterns of use for which the building was designed. Preferred locations are adjacent to internal brick walls. Mezzanines should not cross Row 8.

Preferred mezzanine locations.



Policy 7.4.9.17
Internal additions must not interfere with the trusses in height, nor suspended services, the ability to run new suspended services. Interference with the existing cranes should be minimised.

7.4.10 Finishes

Policy 7.4.10
Use appropriate industrial finishes for existing fabric and modern finishes for new work.

The place has a range of industrial finishes which have not been analysed in detail. Some are not well understood eg. 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.

Policy 7.4.10.1
In any future work affecting the finishes of the building, samples should be taken and analysed to determine the original finishes.

Policy 7.4.10.2
Maintain and do not diminish the industrial character of finishes.

Policy 7.4.10.3
Old finishes such as limewashing or lacquering should be executed by specialist tradespeople under experienced supervision.

Policy 7.4.10.4
Do not over finish so that the place looks new.

7.4.10 Services

Policy 7.4.10
Retain significant early services and expose and suspend new services according to the building's structural grid.

Eg. See illustration, page 156.

Policy 7.4.10.1
Retain remnants of early twentieth century wiring, insulators and associated elements.

Policy 7.4.10.2
Utilise existing early light fittings.

Policy 7.4.10.3
Expose and suspend new services from the existing structure in the manner of past services. Devices such as cable trays are recommended and burying, chasing or covering services in false work is unnecessary and undesirable.

Policy 7.4.10.4
Relate installation patterns of new services to the grid pattern of the building and do not indiscriminately locate.

7.5 ELW MACHINERY POLICY

These policies for the machinery do not stand alone but should be considered in relation to the preceding general and building policies. Note in particular the general machinery policies in section 7.3.9.

Preamble

The following conservation and maintenance procedures are guidelines only. Before any work is commenced on any of the machinery in Bays 1-4a a Conservation Plan should be prepared for each group of machines and the work should then be supervised by a skilled practitioner in consultation with an industrial archaeologist. Because of the condition of the machines it has not been possible to supply a detailed analysis of the problems that are likely to be encountered when these items are being conserved.

The Community and Heritage Retention Unit of the DPW&S, as project director, is currently organising the carrying out of a Management Plan for Moveable Heritage Items/Relics at the Locomotive Workshops at Eveleigh.

The relics in Bays 1-4a fall into several categories of deterioration, each of which requires a different method of preservation and maintenance. The machinery, tools and equipment in the workshops at present can be divided into the following categories of deterioration:

1. Heavily externally rusted, unpainted blacksmiths' tools and partially completed work
2. Machines which 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;
3. Machines which have corroded internal power or driving components or components which require preventative maintenance
4. Machines and equipment belonging to the steam system which may contain water in internal surfaces, valves, cylinders and piping
5. Machines belonging to the hydraulic system which may contain water in internal valves, pipes and pistons

7.5.1 Generally

Policy 7.5.1
Conserve in situ relics in Bays 1-4 (including annexes), relics moved to Bays 1-4a, in situ relics in Bays 5-15, eg, cranes and identified relics adjacent to the ELW, eg. the traverser.

Some one hundred and twenty three relics remain in situ in the workshop Bays 1-4. Relics have been moved to Bays 1-4 and other relics eg. wall cranes and overhead travelling cranes remain in situ in Bays 5-15.

Policy 7.5.1.1
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 until very recently, reconstruction may only be considered for a few relics.

Policy7.5.1.2
Machinery presently in its original locations should be conserved in situ, either operating or static.

Policy 7.5.1.3
Protect all significant elements from moisture.

Policy 7.5.1.4
Prepare a conservation plan for any group of relics or individual relics which are to undergo restoration, reconstruction or adaptation. This should be brief but is to include advice from a machinery conservator and consultation with former operators, etc.

Policy 7.5.1.5
If moving of any significant element from its present position is necessary prepare a complete report on its condition and make an archival record.

Policy 7.5.1.6
Permanently affix a tag to any element 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 7.5.1.7
Do not remove any part of any assemblage, system or collection from the parent relic. This includes all tools, stands and operating equipment.

Policy 7.5.1.8
Catalogue and annotate all records found on site and lodge with the State Rail Authority Archive. Keep copies of relevant material at a secure but accessible location on the site.

Policy7.5.1.9
If removal of any machinery off-site is unavoidable consider locating in the SRA Heritage and Cultural Precinct, ie the Eveleigh Carriage Workshops.

7.5.2 Maintenance Inspections

Policy 7.5.2
Carry out inspections for corrosion and maintain anit-corrosion measures.

It is essential that regular inspections take 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 machines

Policy 7.5.2.1
Each machine is to be inspected at 12 month intervals

Policy 7.5.2.2
Commence and keep a diary of maintenance inspections and treatment of each machine. Keep with a copy of the conservation plan.

Policy 7.5.2.3
Undertake conservation procedures including treatment of corroded areas, where necessary, as specified following the inspection.

7.5.3 Cleaning

Policy 7.5.3
Clean as necessary to allow conservation action.

In some cases a relic will have to undergo several distinct preservation measures.. In most cases relics 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 7.5.3.1
Clean all relics which have 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 7.5.3.2
Steam cleaning must immediately precede subsequent surface finishing and extensive time delays between any treatment and the next must be avoided.

Policy 7.5.3.3
Thoroughly force dry elements which have been steam cleaned and a water dispersant used prior to a application of a preservative.

7.5.4 External Surfaces

Policy 7.5.4
Treat external surfaces according to existing finish and condition and according to individual recommendations.

Many relics, 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 7.5.4.1
External surfaces should be treated to preserve them, predominantly with a preservative.

Policy 7.5.4.2
Repaint some machines. This is only to be done where recommended by and in accordance with the Conservation Plan for individual machines.

Heavily rusted, unpainted

Policy 7.5.4.3
Remove any deep or flaking rust with a wire brush.

Policy 7.5.4.4
Spray the surface of all relics in this category with a commercial phosphoric action solution such as Ferropro. Before spraying it is essential to ensure that all surfaces are free from rust and completely dry.

Lightly rusted, unpainted

Policy 7.5.4.5
Thoroughly wire brush the rusted areas and remove all traces of rust. Any flaking or loose paint should also be removed by brushing.

Policy 7.5.4.6
Wipe the whole surface clean with a solvent and then sprayed with a preservative such as Volvoline TECTYL 506. This agent puts a seal over the surface which will then last for two years without further attention

Policy 7.5.4.7
In moist areas use a water dispersant two hours before spraying with preservative

Painted and flaking

Policy 7.5.4.8
Partially or completely remove the existing coat of paint using flame and wire brushing where recommended by an individual conservation plan.

Policy 7.5.4.9
Coat the exposed surface, while still warm, with a zinc phosphate primer following at specified intervals by two coats of high gloss enamel.

7.5.5 Internal surfaces

Policy 7.5.5
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 7.5.5.1
Remove oil and grease from external gear wheel trains, drive shafts, bearings and clutches for close inspection, prior to treatment with preservatives.

Policy 7.5.5.2
Top up gear boxes and sumps with oil initially and then finally strip and clean prior to further conservation measures as recommended in a Conservation Plan.

Policy 7.5.5.3
Regrease all bearings and moving parts such as gears, covers, handles to ensure they do not seize following the completion of cleaning and surface protection measures.

7.5.6 Provision of steam and power

Policy 7.5.6
Provide steam and power to enable conservation measures to be carried out.

Prior to the imminent closure of the workshops recommendations were made to the SRA to have the equipment contained in the workshops treated prior to the closing of the workshops. It is not known 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.

Godden, Relics Policy, 1988

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.

Policy 7.5.6.1
Supply steam to the workshop by introducing a portable boiler to the steam system and preserve the steam system as in the following policies.

Policy 7.5.6.2
Provide DC power to overhead travelling cranes to enable their conservation and use.

7.5.7 Boilers - fireside

Policy 7.5.7
Preserve fireside of boilers.

The following recommendations were made in the 1988 report. If possible the boilers should be surveyed and recommissioned and the 1988 recommendation followed...

Policy 7.5.7.1
Fire the boilers and when cool, thoroughly clean the fireside system with a sodium carbonate solution to neutralise any acidic residue.

Policy 7.5.7.2
Dry the fireside system with a hot air blower and coat with Cortec 307, (or equivalent), which is sprayed throughout as a powder

7.5.8 Boilers - steamside

Policy 7.5.8
Preserve steamside of boilers.

The following policies are based on those in the 1988 report. In the intervening seven years since that report was 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.

Policy 7.5.8.1
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 boiler. Operate the engines and hammers connected to the steam system. Add further amine solution to the boiler with the feedwater.

Policy 7.5.8.2
Lower the steam pressure at the boiler. Close down and drain the 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 7.5.8.3
Completely dry the boiler with a warm air fan if necessary. Place a tray of silica gel inside and completely seal the boiler.

Policy 7.5.8.4
Arrange a complete inspection of the boiler with a licensed boiler inspector. Once this has been carried out a new set of recommendations should be included in the Conservation Plan for the boilers.

7.5.9 Steam Engines and Hammers

Policy 7.5.9
Preserve steam engines and hammers.

A steam source is required to carry out preservation measures. As mentioned above this may be done through the introduction of a small portable boiler.

Policy 7.5.9.1
Bring the steam engines, including the Rootes Blowers and the Steam Hammers, into operation

Policy 7.5.9.2
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 above). They should then be resealed.

7.5.10 Hydraulic System

Policy 7.5.10
Preserve the hydraulic system.

A complete and thorough inspection of the hydraulic system should be made. 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 4 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

Policy 7.5.10.1
Arrange for inspection of the hydraulic system.

Policy 7.5.10.2
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 7.5.10.3
Operate each of the presses to ensure that the whole system is flushed out.

Policy 7.5.10.4
Drain the water should be drained 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 7.5.10.5
Drain completely and reseal the system. The additive will protect the internal systems for up to two years

7.5.11 Davy Press

Policy 7.5.11
Preserve the Davy Press.

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.

Policy 7.5.11.1
The Davy Press will have to be examined for excess corrosion throughout its whole system. This especially applies to the steam reservoir and the backup system.

Policy 7.5.11.2
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. The water should then be drained.

7.5.12 Relocated Machinery

Policy 7.5.12
The relocated machinery should be treated with preservative in the short term and conserved in former locations or in a new location in Bays 1-4 in the long term.

Some 21 relics have been moved from other areas to Bays 1-4 to protect them when the area was turned over to Paddy's Markets. There is superficial rust on most of these pieces including lathes and drills.

The long term conservation management of these items will have to be determined by individual conservation plans. At present there is no plan to recommission these machines and it is unknown whether they will be reinstated in their original position or mounted in Bays 1-4.

Policy 7.5.12.1
Subject to the general policies and the conservation plan 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 Bays 1-4 and make operational***
- ***locate in Bays 1-4 as static display.***

Policy 7.5.12.2
It is preferred that these should be cleaned with solvent rather than with high pressure water or steam

Policy 7.5.12.3
If there is any moisture present on this equipment it must be sprayed initially with a water repellent such as TECTYL 401, then later with the preservative.

Policy 7.5.12.4
The whole surface should then be coated with a preservative such as TECTYL 506

Policy 7.5.12.5
Generally it is not appropriate to move 'antique' machinery from other sites to ELW and if it is it should be clearly labelled to distinguish it from machinery originating from ELW.

7.5.13 The Traverser

Policy 7.5.13
Conserve the traverser.

The traverser is now located outside the building but was an important component of the workshops' operation and it, or one very similar, was formerly located within the building. Detailed investigation has not been made of the machinery itself or how it relates to the future development of the site.

Reference should be made to the Conservation Plan for the traverser by Godden Mackay PL.

Policy7.5.13.1
Further investigate the history and condition of the traverser.

Policy7.5.13.2
Investigate the feasibility of conserving the traverser in situ while allowing emergency vehicle access.

Policy 7.5.15.3
If feasible, conserve the traverser in situ.

7.6 RECOMMENDED TREATMENT GENERALLY

As detailed previously the preferred approach to conserving these buildings is for stabilisation and repair. This would involve repair and maintenance to arrest the decay of the buildings and prevent any further deterioration of the structural members as well as the existing components, materials and finishes.

In general, treatment of fabric, spaces and qualities should be as below (The appropriate treatments are after J. Kerr's "The Conservation Plan", 1990, p.48). The levels of significance are set out in Section 5.6 (pages 112-114) of this report.

Level of Significance	*Recommended Treatment*
Outstanding	As for high.
High	Preserve, restore, reconstruct, adapt in accord with the Burra Charter, in conjunction with minimum adaptation for supplementary new construction if required for function.
Moderate	Retain in-situ in accord with the Burra Charter preferred. Adaptation of removal in part is acceptable if necessary for conservation of fabric of outstanding or high significance, or for adaptive reuse to ensure overall conservation. Retention may depend on factors other than heritage value.
Low	Retain, recycle, add compatible new construction and/or remove in part as necessary for adaptive reuse value, minimising adverse impact on fabric of outstanding or high significance and having the least practicable impact on fabric of moderate significance. Conservation of overall form and configuration preferred, often already substantially altered and can accommodate other change.
Intrusive	Remove or modify, in long term, to reduce adverse impact.

8. STRATEGY

8. STRATEGY

The strategy for implementing the conservation policies of Section 7 of this plan requires further development in consultation with the owner and stakeholders in the site. The strategy needs to continue to develop. In many cases factors other than conservation need to be considered in deciding on the most appropriate conservation action. These include financial resources, availability of technical and other staff, sequence, timing and management structure. The building fabric inventory is the basis for implementing the conservation policy for conservation action. Some general strategic issues are discussed followed by a detailed strategy for implementation of policies.

8.1 URGENT WORK

Some urgent works are currently being addressed in a package of emergency works. This package is covering practical issues such as the transfer of power supply to Sydney Electricity and the reconnection of the fire hydrants. It also covers the installation of chain wire gates and fencing the site for security and to limit public access and thereby provide protection from potential falling stone etc. Security of the building is also being provided for by temporary use of the building.

The emergency works also include temporary measures to stabilise the parapets at the north-east and south-east corners and to prevent water entry through holes in the roof. **If for any reason the emergency security and stabilisation measures do not proceed they should be urgently addressed.**

Other conservation works with a **high degree of urgency** are:

- the disposal of stormwater,
- the making safe of stonework and
- making the building watertight.

There is no danger of immediate collapse or damage from these defects unless they are destabilised by other works. Urgent works should be undertaken as soon as is possible consistent with developing an overall strategy for the place. The exception is water entry in occupied areas, particularly where electricity is in use.

If leaks occur in areas where electricity is in use they should be rectified urgently, (probably on a temporary basis).

8.2 TOTAL ASSET MANAGEMENT

The Heritage Assets Guidelines prepared by NSW Public Works note that "*State Government instrumentalities are major custodians of our heritage assets, and as such have a responsibility for managing the State's heritage*". In accordance with State Government policy it is recommended that a Total Asset Management Strategy be prepared as an aid to future planning and establish mechanisms for on-going maintenance.

The preparation of a Conservation Plan is a step towards the preparation of such a strategy. In the case of the ATP Masterplan area, which includes a number of heritage buildings, a Total Asset Management Strategy should consider all of the buildings not only Eveleigh Railway Workshops. This implies coordination with SRA to include other ares of the precinct. One of the aims of such a strategy is to avoid short term decision making which can be particularly detrimental to heritage buildings.

Once the significance of the assets has been determined a strategy for their future on-going protection can be determined. This strategy should include:

- mechanisms for the future asset management;
- a maintenance program;
- suitable future uses;
- mechanisms for funding for future maintenance and capital works.

8.3 APPROACH TO STRATEGY AND IMPLEMENTATION

8.3.1 Priorities for Conservation Action

The building fabric inventory which accompanies this conservation plan is the key document to guiding the implementation of the conservation policies and the conservation plan. It's recommendations for actions are based on the policies and interpret them in detail for each element. Conservation action should be based on the inventory. The inventory has, at present, been completed for key areas of the building only.

Regardless of the interim or final use to which the place is put and the adaptation required for new uses, works are required to the building and machinery to make it safe, make it watertight and to protect the fabric from deterioration.

Limited funds are currently available for works to the building From the NSW Government through the CWDC. Consideration needs to be given as to how to best approach the works. Certain works are urgent for safety reasons as mentioned above. These works are underway or will be addressed in the immediate future as part of initial site infrastructure works.

Other works are critical for building fabric conservation for the whole of the building. These defects are worst at the east end but need to be rectified for the whole building. They include:

- rectification of all stormwater drains by clearing or replacement,
- making the roof watertight,
- securing the building,
- making the high level stonework safe.

These works should be carried out for the whole building and a maintenance strategy set in place before remedial fabric works are undertaken. Remedial works can then be done progressively from east to west. Funds should be set aside under the current funding arrangements to do a minimum level of work over the whole building.

There is currently a proposal to execute works to the east wall prior to any works being carried out in the rest of the building. It is acceptable to do this if funds are retained for a minimum level of works to the whole building. It is inappropriate to do a high level of work on the east wall and none or little on the remainder of the building.

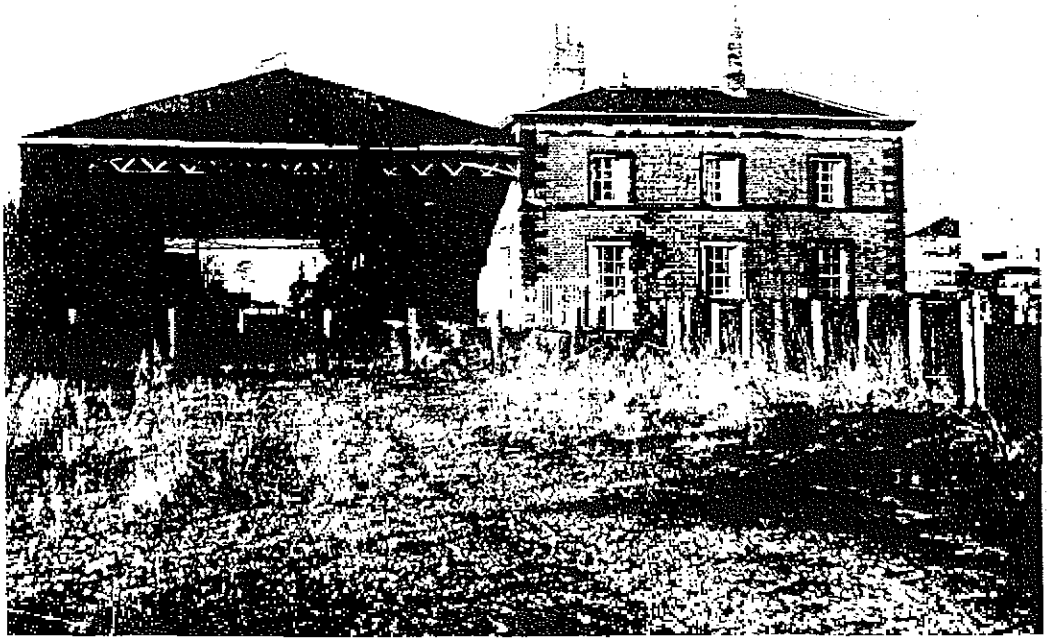


Illustration 5. 1 Pocklington Station at Humberside, built in 1847, shown after the closure of the rail line. Binney & Pearce, p.220.

8.3.2 East Wall

The east wall is adjacent to 'Innovation Plaza' which is currently being developed. It will now become the main public face of the ELW. It is planned that some works to this wall will proceed concurrently with the landscaping works. This wall is compromised by intrusive alterations, structural defects and damage from embedded downpipes.

The recommended approach is to prioritise the provision of adequate stormwater disposal and the repair of structural defects. Also doors recently dislodged during landscaping works should be secured or replaced. Repair of structural defects involves the removal of embedded steel beams. In these cases the wall can be reconstructed to its earlier form to provide structural integrity and to recover aesthetic value. The early form of the wall was with a central door in Row 8, cast iron windows in every second row (even numbered rows) and 'blind' arches in every other row (odd numbered rows). This configuration still remains on the west wall.

Intrusive elements, ie. aluminium windows and steel enclosures, can be removed and the wall and windows reconstructed to recover its aesthetic value. If present openings are required for new use then they may be adapted provided their detailing enhances the aesthetic and other significances of the ELW.

The wall should not be reconstructed to give it an appearance that it never had, eg. with cast iron windows in every row. If openings are required to be retained in rows where there was no opening originally it is preferable to distinguish the treatment of such openings from the reconstructed windows and door. In some cases a modern treatment, such as a large glazed structure replacing the existing metal enclosure in Row 9, is acceptable. Any such modern treatments should match the original building in terms of design and construction excellence, ie. it should be a sophisticated, purpose designed treatment.

At this stage expenditure should be the minimum necessary. Limited funds should not be spent on extensive stonework replacement at the expense of stormwater drainage to the remainder of the building. For example, it may be adequate to replace missing plinths, which are largely below ground, with concrete though this would require careful detailing and execution.

The building fabric inventory gives detailed information for the implementation of conservation works to the east wall and easternmost bays of the north and south walls.

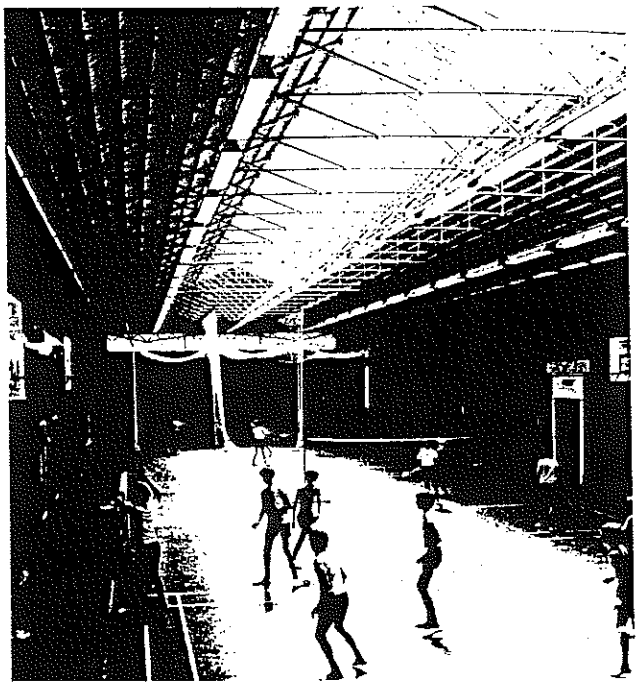


Illustration 5. 2 Pocklington station was reused as a sports hall by a local school. The station rooms were used to provide change rooms and facilities and the shed as courts. Binney & Pearce, p.121.

8.4 IMPLEMENTATION OF POLICIES

This section groups the policies according to when action is required and indicates who is required to take action. Some policies are overall guiding policies and apply all the time. In some cases responsibility for policies will change over time, generally to the ATPSL when it takes up the lease. If for some reason this does not happen these policies become the responsibility of whoever is the lessee. Where policies have continuing application they are shown when they first occur with the note '& in future'. Where the word 'all' is used it includes all the authorities and organisations who have responsibility for the site , any users and designers, builders and contractors involved with the site. Abbreviations used are as follows:

ATPSL	Australian Technology Park Sydney Limited,
contractors	refers to anyone physically doing work on the place'
CWDC	City West Development Corporation,
CP	Conservation Plan
DUAP	Department of Urban Affairs and Planning
esp.	especially,
designers	refers to architects, engineers or others responsible for the design of works
PWPM	Public Works Project Management, or other project management in the future,
SRA	State Rail Authority

8.4.1 Guiding Policies - apply now and in the future.

No.	Description	Responsibility
7.3.1	Over-riding principles	All
7.3.4	Setting	All, esp. ATPSL and designers.
7.3.6	Compatible use	CWDC, ATPSL, designers.
7.3.7	Design of new work	CWDC, ATPSL, designers.
7.3.8	Building - guiding policies	CWDC, ATPSL, PWPM, designers
7.3.9	Machinery - guiding policies	CWDC, ATPSL.
7.3.10	Non-conservation intervention	PWPM, contractors
7.3.12	Archaeology	CWDC, ATPSL, PWPM
7.4.4	Preserve integrated roof system	CWDC, ATPSL, designers.
7.4.5	Approach to brickwork	CWDC, ATPSL, PWPM, designers, contractors
7.4.6	Approach to stone	CWDC, ATPSL, PWPM, designers, contractors
7.4.7	Cleaning	CWDC, ATPSL,PWPM, contractors
7.4.8.5	Cleaning cast iron window frames	CWDC, ATPSL,PWPM, contractors
7.4.8.7 7.4.8.15	Minimise new windows and doors	CWDC, ATPSL, designers.
7.4.8.11	Use skilled joiners.	PWPM, ATPSL, contractors
7.4.8.12 - .15	Doors generally	CWDC, ATPSL, PWPM
7.4.9.	Preserve columns.	CWDC, ATPSL, designers.
7.4.9.5-6	Girders and crane rails	CWDC, ATPSL, designers.
7.4.9.9 - .12	Sub-surface remains - approach	CWDC, ATPSL.
7.4.9.14 - .16	Mezzanines	CWDC, ATPSL, designers.
7.4.10	Finishes	CWDC, ATPSL, designers.
7.4.11	Services strategy	CWDC, ATPSL, designers.
7.5.1	Conserve machinery, don't move.	CWDC, (ATPSL in future)
7.5.2	Machinery inspections.	CWDC
7.5.12.1	Relocated machinery, options	CWDC, ATPSL, designers.

8.4.2 Policies for Immediate Action

7.3.1.7	Urgent works	CWDC, PWPM
7.3.1.1	CP - adopt	ELWSC, CWDC
7.3.2.2	CP - endorse	DUAP
7.3.2.3	Structure of responsibility	CWDC (ATPSL in future)
7.3.2.4	Individual responsible	CWDC, PWPM, (ATPSL in future)
7.3.2.5	ELWSC - overseeing role	ELWSC (?? in future)
7.3.2.6	Integrate - Eveleigh Precinct.	DUAP, CWDC, SRA, ATPSL
7.3.3.2	CP - copies	PWPM, CWDC
7.3.3.4	Prepare Carers Guide.	CWDC,
7.3.8.9 .10	Removal of significant fabric.	PWPM, contractors (& in future)
7.3.10.2 .3	Non conservation intervention.	CWDC, PWPM, contractors (& in future)
7.3.12.3 .4	Archaeology	CWDC, PWPM, contractors.
72,81,87 118-9,73	Carry out investigations into physical fabric Test techniques	CWDC, PWPM
7.4.3.1	Monitor structural defects	CWDC, PWPM
7.3.3.3 7.4.1.1 7.4.8.1	Complete building fabric inventory	CWDC, PWPM
7.4.4.13 - .14	Downpipes - east wall.	CWDC, PWPM
7.4.6.2	Make stone safe and assess.	CWDC, PWPM
7.4.9.7	Do not apply heavy loads to piles.	CWDC, PWPM, contractors.
7.4.9.8 & .13	Leave rails, pipes etc. in situ	CWDC, PWPM, contractors.

8.4.3 Policies for short term Action - 6 months to 2 years

7.3.2.7-8	Development application.	CWDC, (& in future)
7.3.5.1	Preserve by stabilising deterioration	CWDC.
7.3.5.3	Prepare Maintenance Plan	CWDC, PWPM, (ATPSL in future)
7.3.5.4	Funds to develop & implement 27.	CWDC, PWPM.
7.3.5.5	Inspections and maintenance by skilled person.	CWDC, PWPM, (ATPSL in future).
7.4.1.3	Video record	CWDC, PWPM.
7.3.11.4	Social history recording	CWDC, SRA
7.4.1.2	Make watertight	CWDC, PWPM, ATPSL
7.4.1.3	Detailed recording	CWDC, PWPM
7.4.3.2	Assess earthquake stability	CWDC
7.4.4.2-3	Analyse & conserve stormwater disposal system	CWDC, PWPM
7.4.4.5 7.4.4.7-9	Preserve original roofing, features.	CWDC, PWPM, (& in future).
7.4.4.11	Make stormwater operational	CWDC, PWPM, contractors
7.4.4.15	Assess truss corrosion, joints.	CWDC, PWPM
7.4.5.1 7.4.5.3-5	Repair brickwork - east wall	CWDC, PWPM, contractors.
7.5.1.2	Protect machinery from moisture	CWDC, PWPM
7.5.1.3	CP's for groups of machinery	CWDC
7.5.3-12	Clean & preserve machinery.	CWDC

8.4.4 Policies for Medium Term Action - 2 to 5 years

7.3.3.5	Review CP.	CWDC, PWPM, ATPSL (& in future)
7.3.3.6	Further research.	CWDC, DUAP, SRA, (& in future)
7.3.5.2	Preserve by maintenance.	CWDC, ATPSL, (& in future)
7.3.11.1 - .3	Interpret.	CWDC,ATPSL (& in future)
7.4.8.2 & .8 & .10	Conserve doors and windows	CWDC, PWPM, ATPSL
7.5.2.2	Inspect machines.	CWDC, ATPSL, (& in future)

8.4.5 Policies for Long Term Action - 5 years +

The policies listed above but which continue into this time frame are:

- 7.3.2.3-7
- 7.3.3.5-6
- 7.3.5.2-5
- 7.3.8.9-10
- 7.3.10.2-3
- 7.3.11.1-3
- 7.4.4.5
- 7.4.4.7-9
- 7.5.1.2
- 7.5.2.2
- 7.5.3-13

Policies, such as 7.4.8.6 which is concerned with the removal of intrusive fabric, can be acted on at any time but do not need to be until the long term.

8.5 CONTEMPORARY USE

8.5.1 Current Use

A large part of the building is currently unoccupied. Some of these areas were formerly temporarily use for theatre productions etc.. These have been suspended while construction works are in progress to the east of the building. Bays 1-8 are in temporary use as previously described and as follows:

- Bays 2 & 3 south, licensed to Guido Gouverneur (blacksmith),
- Bay 4a, historic materials store,
- Bay 5S & part Bay 6S, SRA emergency electrical,
- Bays 7 & 8, Barclay Mowem and PW project managers site offices.

The continued temporary occupation of the place is important for its conservation. Occupation is a vital component of providing security and a minimum level of maintenance. In particular the use of Bays 2 & 3 south means some of the machinery is operated, there is a degree of maintenance of other machinery, there is some security and some informal curatorial and interpretive advice. It also provides a point for former workers at the site to make contact. This is valuable to make contacts for advice on the operation of particular machinery and for future oral history.

Interim uses, particularly the use of Bays 1-4, should continue until the site is in permanent use as it provides and ensures a minimum level of conservation. Interim users should have a basic level of information on the place - as would be provided by the Carer's Guide' recommended in the policies.

8.5.2 Proposed Use

The proposed use of the ELW for the ATPSL is outlined in section 6. Funding is not available for many of the uses proposed at present and is dependent on the continuing success of the ATPSL. In view of this and because there are likely to be a range of interim uses this report has not considered a broader range of uses.

The uses proposed are generally compatible with the significance of the place. In particular the preservation of the machinery in Bays 1-4, the educational and interpretive use, the manufacturing and training components and the exhibition space which retains the large space. The feasibility of these uses and demand for these uses has not been assessed by this report.

The detailed adaptation for such uses is to be guided by the policies of this conservation plan. Provided the adaptation required for these uses complies with the policies there are few areas of conflict. The major area of conflict is the need to keep the machinery operational and operating as a workshop. The museum proposal accommodates this in a minor way but the operation of the machinery is in conflict with ideas for interpretation. For example, the dust and vibration associated with the operation of the machinery is incompatible with video displays. Many of these issues can be resolved in the detailed brief for the facility and in its detailed design.

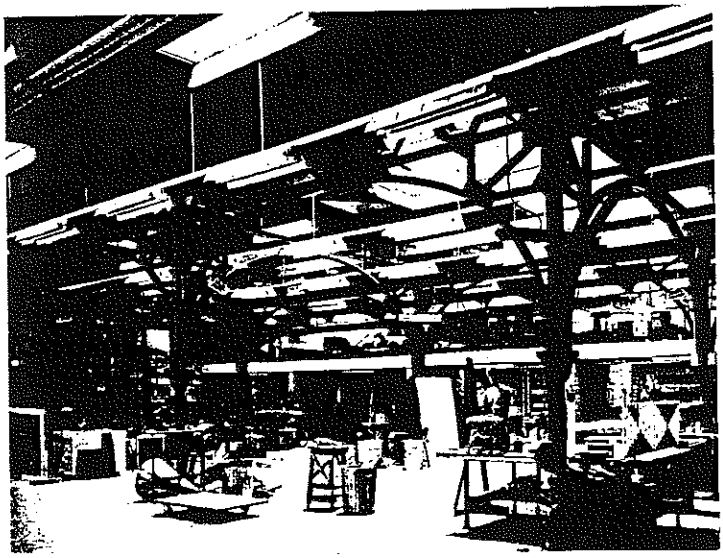


Illustration 5. 3 This workshop has been reused as a pottery and sculpture workshop.
Binney & Pearce, p. 227.

8.6 FUTURE USE

8.6.1 Possible Uses

A limited assessment of reuse of railway buildings in other countries reveals a wide range new uses. These include residential, warehousing, education, manufacturing, industrial functions, transport museums, theatres and cinemas, gymnasium and sports facilities, restaurant and tourism facilities. Examples are shown in illustrations and the captions comment on the relevance to Eveleigh and the character of the adaptation. Most of these uses would be possible at Eveleigh and could be suitable for temporary or permanent uses. Industrial use is most in keeping with the character and significance of the building and is appropriate in whole or in part.

Sports facilities are in high demand in the area with the upsurgeance of interest in basketball and interest in new sports such as in-line (skating) hockey which are not well catered for. Such sporting facilities require little intervention and would be suitable as permanent or temporary uses. The Olympics may stimulate such demand temporarily. Warehousing is an obvious but not highest and best use but may be appropriate for temporary uses. Manufacturing and industrial functions are highly compatible with the place's significance and link well with the Technology Park. These could be temporary or permanent uses of part or the whole of the place, in particular Bays 1-4.

Museum use is obvious for Bays 1-4 but not entirely compatible with the requirement to keep the machinery operating and producing. It is also intensive in terms of investment and not feasible or appropriate for the whole place. The location on the railways at a crucial node and close to the Power House Museum add to the feasibility and adaptability for railway related museum use but detailed consideration is required. Care also must be taken as museums can require a high degree of intervention. For example the initial museum use of the Hyde Park Barracks required inappropriate intervention to display unrelated museum exhibitions. The current adaptation minimised intervention and recognised that it was important to interpret and display the place itself.

Educational use is suitable for part of the place and is proposed for a small area. The larger spaces would also be suitable for large scale exams or marking but this is a temporary or ancillary use in conjunction with other uses eg. exhibitions. The place has also been in demand for large scale theatrical productions. This demand relates to the existence of the large scale, uninterrupted simple spaces which if retained and serviced with adaptable facilities may still be able to service a range of such uses. This may make feasible any main permanent use by providing additional rental income.

The discussion above and the size of Eveleigh indicate that a mix of uses is likely and appropriate both in time and space. This indicates that there will be a need for a continuing high degree of management to coordinate uses and the care and conservation of the place as a whole. Conversions overseas are mostly of small or medium sized buildings with few very large complexes being tackled. Larger, and more difficult to adapt buildings have more often been demolished or left to deteriorate. Few, if any have attempted to retain the industrial character and workshop use. The few operating workshop such as Ironbridge have imported equipment into the facility to create an atmosphere and facility formerly lost. Eveleigh presents a unique and challenging opportunity.

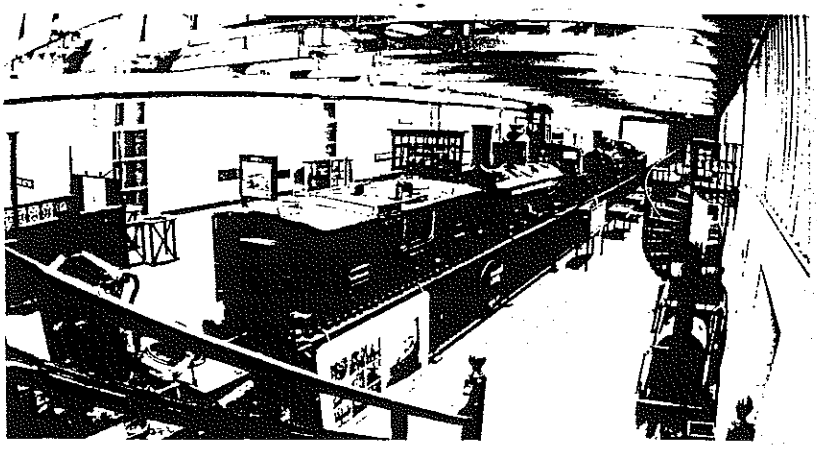
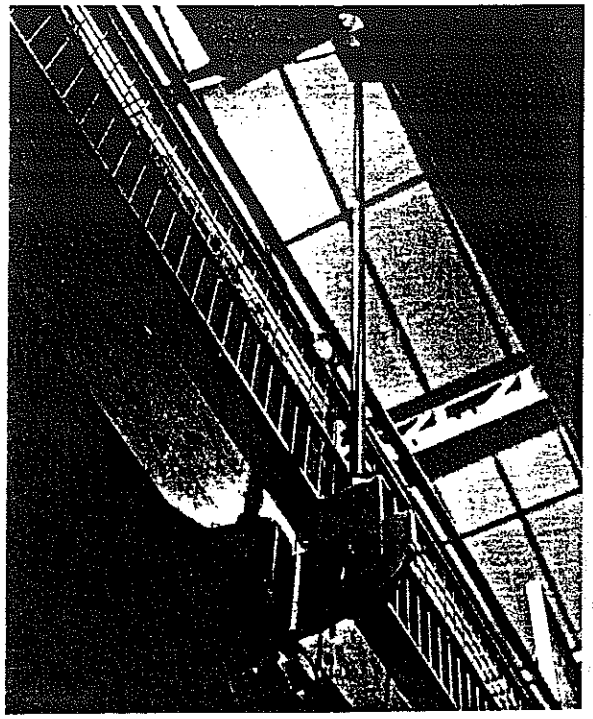


Illustration 5. 4 The terminus of the Stockton-Darlington Railway, 1842, reused as a railway museum. Binney & Pearce, p.219.



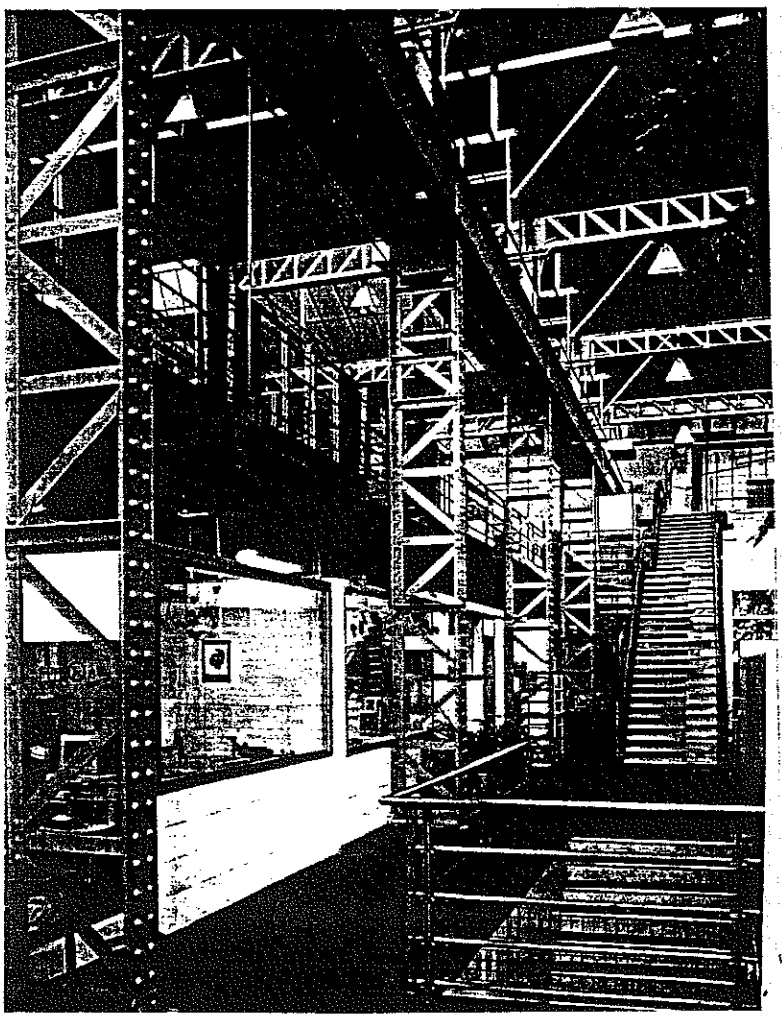


Illustration 5. 5 The Communication Pavilion of the National Centre for Scientific Research in Meudon, France, is in a 1920's industrial building converted by architects Reichen & Robert in 1988. The interior is open and spacious with a play of levels. The structure is exposed lending rhythm and coordination to the interior. The mezzanines are suspended from the travelling crane rails with industrial style detailing. Pelissier, pp. 86-7.

8.6.2 Guidelines for Use

Any design for new use should be guided by the policies of this conservation plan. The design of works for adaptation for any new use should be a genuine interpretation of the historical material with which the design has to contend. Thereby the new work and historical material combine to increase the overall value of the place.

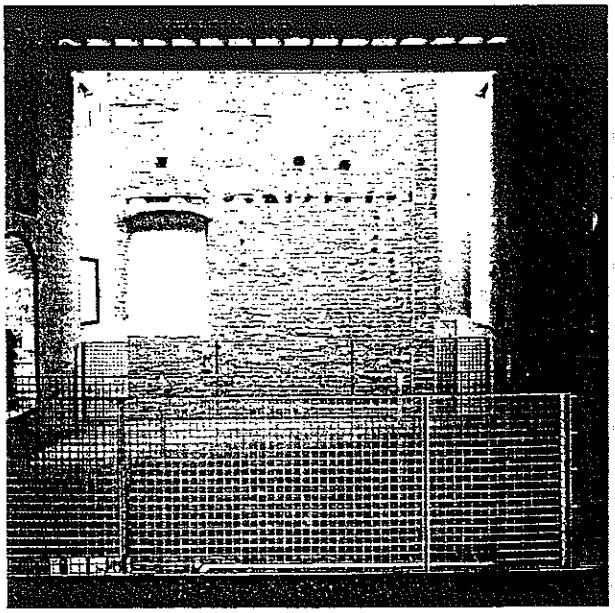
Adaptation should address existing spatial qualities including the organisation of the plan, the pattern of solid and void and issues of scale, material and proportion. The patterns of use should be based on the original patterns with access from the south, along bays and across the central road. This was governed by the use and capabilities of the cranes and the ideal reuse would use the cranes for moving items along bays, for example, exhibition panels or internal subdivisions. The Stella Matutina Agricultural and Industrial Museum is in a former sugar factory which now houses 'a panoply of functions'. The architect, Reichen, points out that "cultural activities are organised in a way which draws on the conveyor belt system of the former sugar factory. This striking form of industrial logic is the cornerstone to the conversion project of the factory." (Reichen & Robert, p. 42)

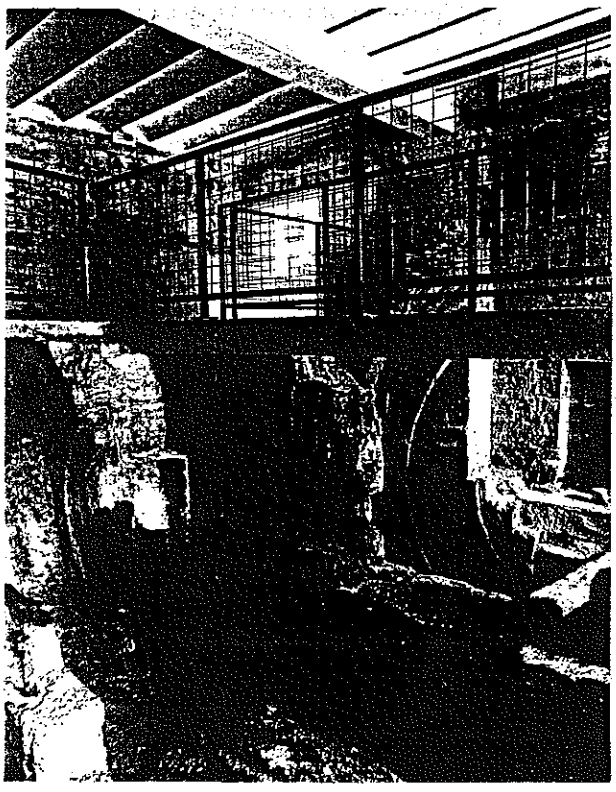
The work of Reichen and Robert is appropriate as an example for Eveleigh though their work does not retain industrial use as is possible at Eveleigh. They accord a high level of importance to flexibility and versatility of space and an integrated system of structural layout grids and ductwork in order to provide adaptability to new functional demands. These considerations are important at Eveleigh as there will obviously be a range of uses at any one time and in the future and the adaptation of the place should accommodate this.

The concept of loose fit should be a guiding principle. The place becomes less flexible and adaptable if elements are highly specific to one function. The alternative is a basic principal and system which relates to the existing structure with specific requirements met individually. This may be , for example a system of ducts, power cabling, air and gas lines on the structural grid which allows take offs where necessary for each use.

The building at present and originally provides only a certain level of enclosure. It provides shelter from rain, sun and wind, security and ventilation via roof monitors. It formerly provided a high level of natural light through roof glazing that has since been removed. It never however provided noise and heat insulation, heating and cooling nor a dust free environment. These features will be required by some new uses, but not others. The provisions of these services to the whole building would be costly and highly intrusive eg. to make a dust free environment and limit noise the roof monitor louvres would have to be enclosed thereby sealing the natural ventilation.

The alternate strategy is to regard the building as an envelope offering a certain level of enclosure and creating an environment part way between outside and inside. Higher levels of services could then be provided at a use specific level only, where needed. This suggests that what is required is the design of a system of provision of spaces and services rather than the design of a specific facility. To be effective this would require analysis of the requirements of a range of altemate uses but the result would allow adaptability to the specific needs of individual users.





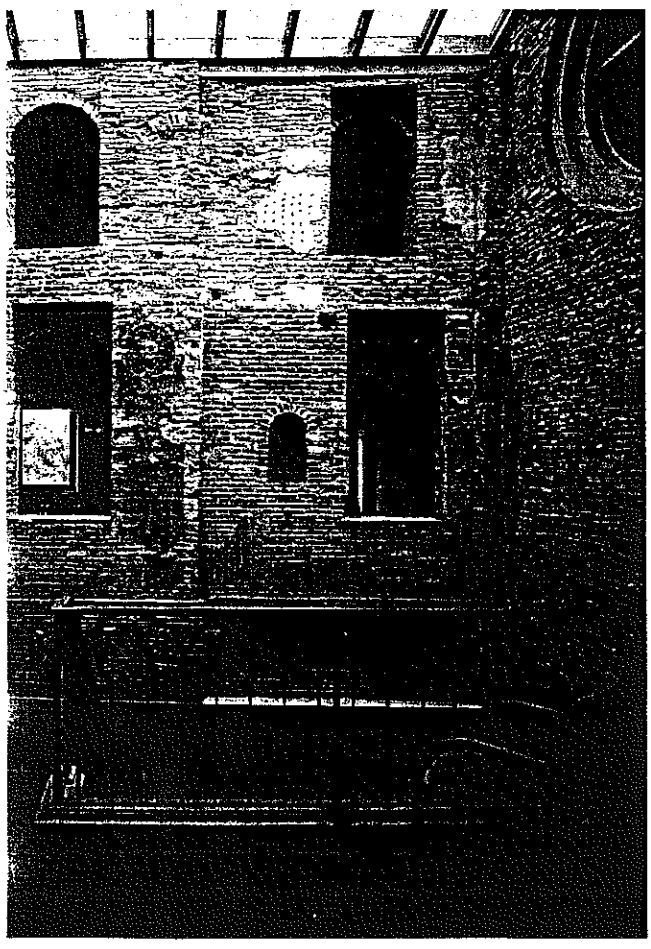


Illustration 5. 6 This former medieval palace in Pisa, Italy, was converted by architect, Massimo Carmassi into exhibition rooms and an audio visual centre. His work aims to expose traces of work carried out throughout history without undue preference to any period. Traces of alterations over time have 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. Robert, p. 15-17.

8.6.3 Advice on Adapting

General advice on adaptation is included in the conservation policies. Brief specific comment is made on issues perceived to be of concern.

The crucial issue is the relationship of new to old. New structures should emphasise and display the existing fabric especially the structural grid and the spaces. Planning should be based on these features which may also provide models for design and detailing principles.

The open spatial character of the place is an important aesthetic attribute. As far as possible the large spaces and the views into the roof space should remain. If subdivision is necessary it should be reversible.

The building envelope should remain intact with additions on the southern side. Limited roof penetrations should be the form and scale of those on the northern ends of Bays 3 & 4.

Alterations and new works can match the old or be expressed as modern designs as shown in the illustrations. The key is excellence, new work should be of high quality in design and construction. The original building was a leader in its time and exhibits a high degree of excellence its construction.

The building is dirty and has been in an aggressive environment for 110 years. Cleaning is necessary to remove damaging materials but the building must not be expected to be returned to its pristine original state. This is not possible without damaging the building fabric.

Roof insulation is a complex issue and needs to be resolved in the detailed design. Insulation at the level of the existing roof involves applying additional loads that need to be assessed and conflicts with the function of the roof lights and the roof vents. Insulation may be better provided at the level of each function that requires it, thereby allowing the air space within the building and the ventilation to provide one layer of environmental control which is added to as needed.

New services should be exposed and suspended within the space in the manner of previous services, eg. the hydraulic lines. They should not be enclosed in falsework. As with other new work they should relate to the existing structure and structural grid.

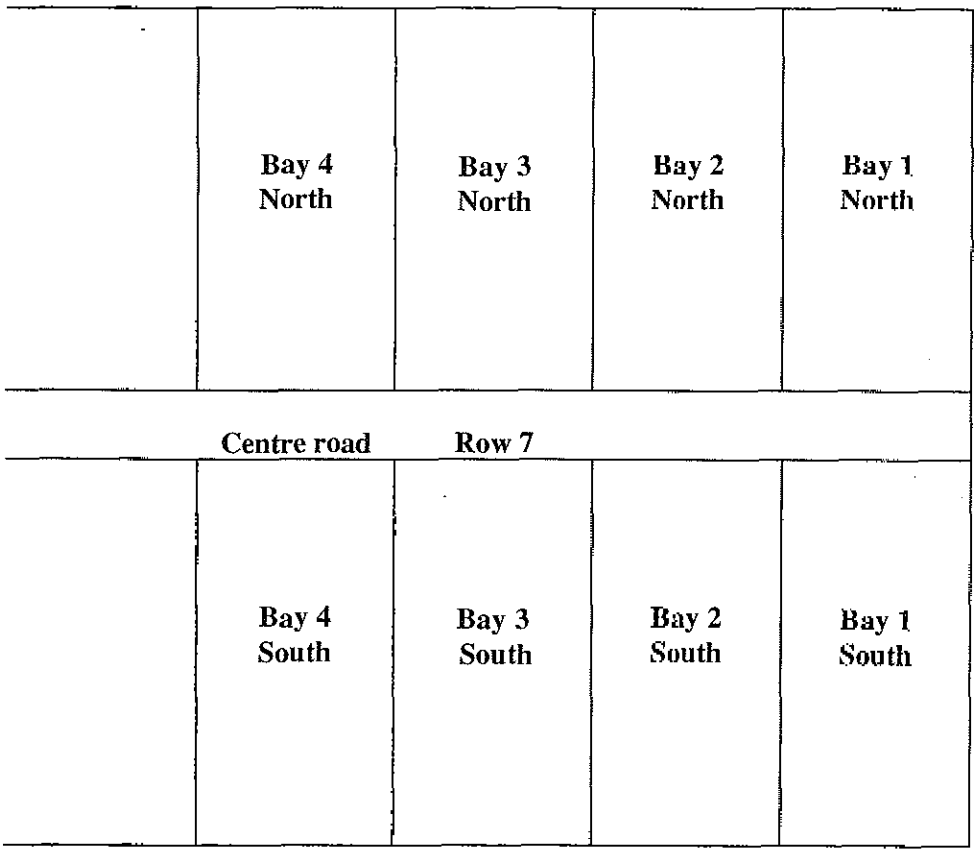
Air conditioning of the whole space conflicts with the existing ventilation , will be costly and is unlikely to be necessary for many functions. It should be provided at the level of need with ducts, or coolant lines run as part of the system of services.

There is limited potential for new openings in the walls and roof and these are addressed in the detailed policies in section 7.4.8. The existing openings are not used to their full potential at present and will be improved by conservation.

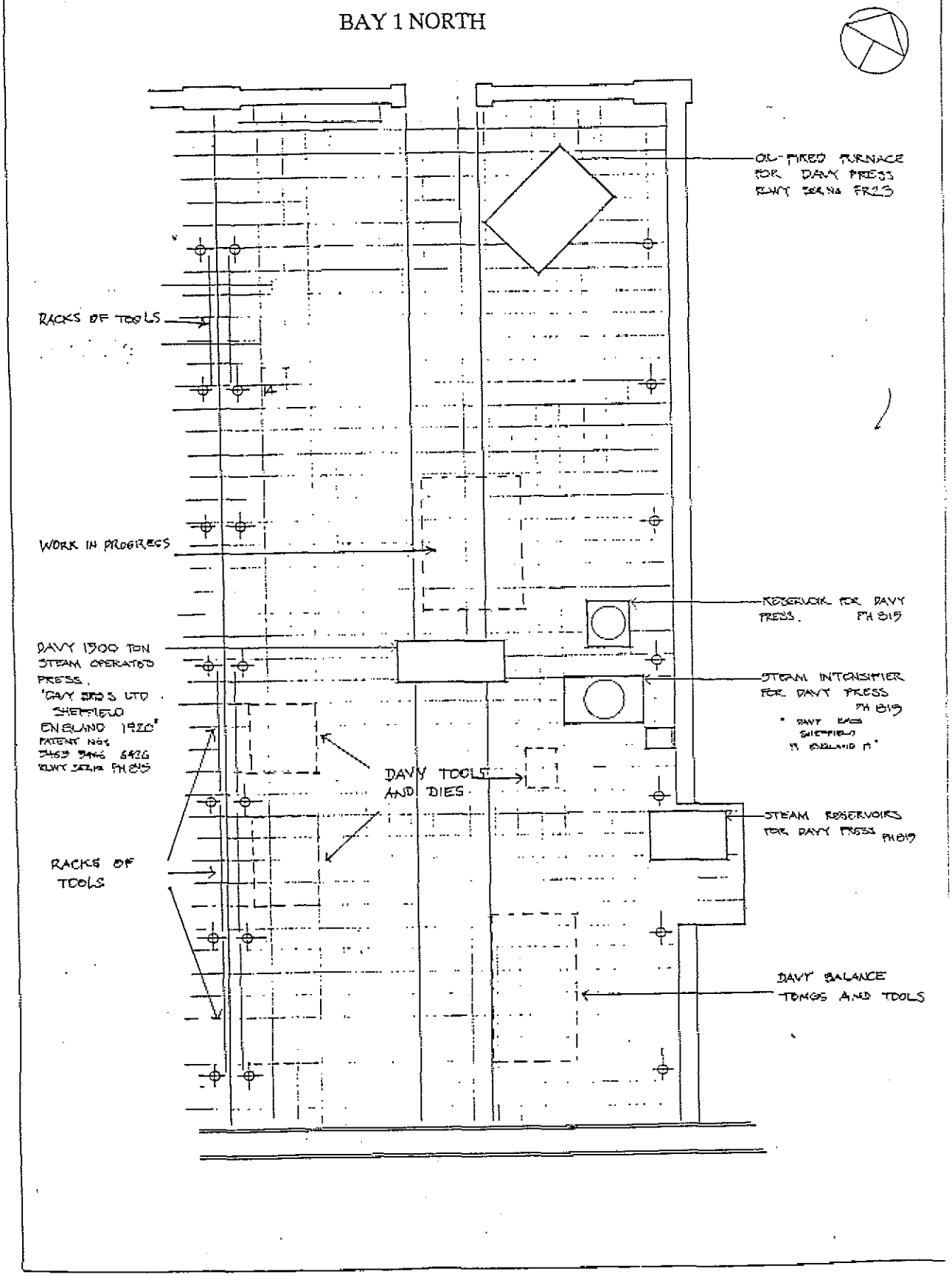
If the provision of additional floor space is necessary mezzanines are an alternate way of doing so. One additional level only is compatible with the building's scale and character and should preferably not break up the main spaces. The Bay 15 mezzanine is compatible but is enclosed by brick walls and not in the major space. The Bay 5 south mezzanine is of moderate historical value but is crudely constructed in comparison to the original structure. The Bay 5 & 6 north mezzanine is intrusive with its crude construction and because it breaks the planning by crossing bays and interferes with and obscures the structure. A more appropriate example is the CNRS building by Reichen and Robert where new mezzanines are hung from the rails of the existing travelling crane (see illustration). This adaptation suspends all new parts of the building because of a concern to make the volumes lighter in order to create an open space.

APPENDIX A

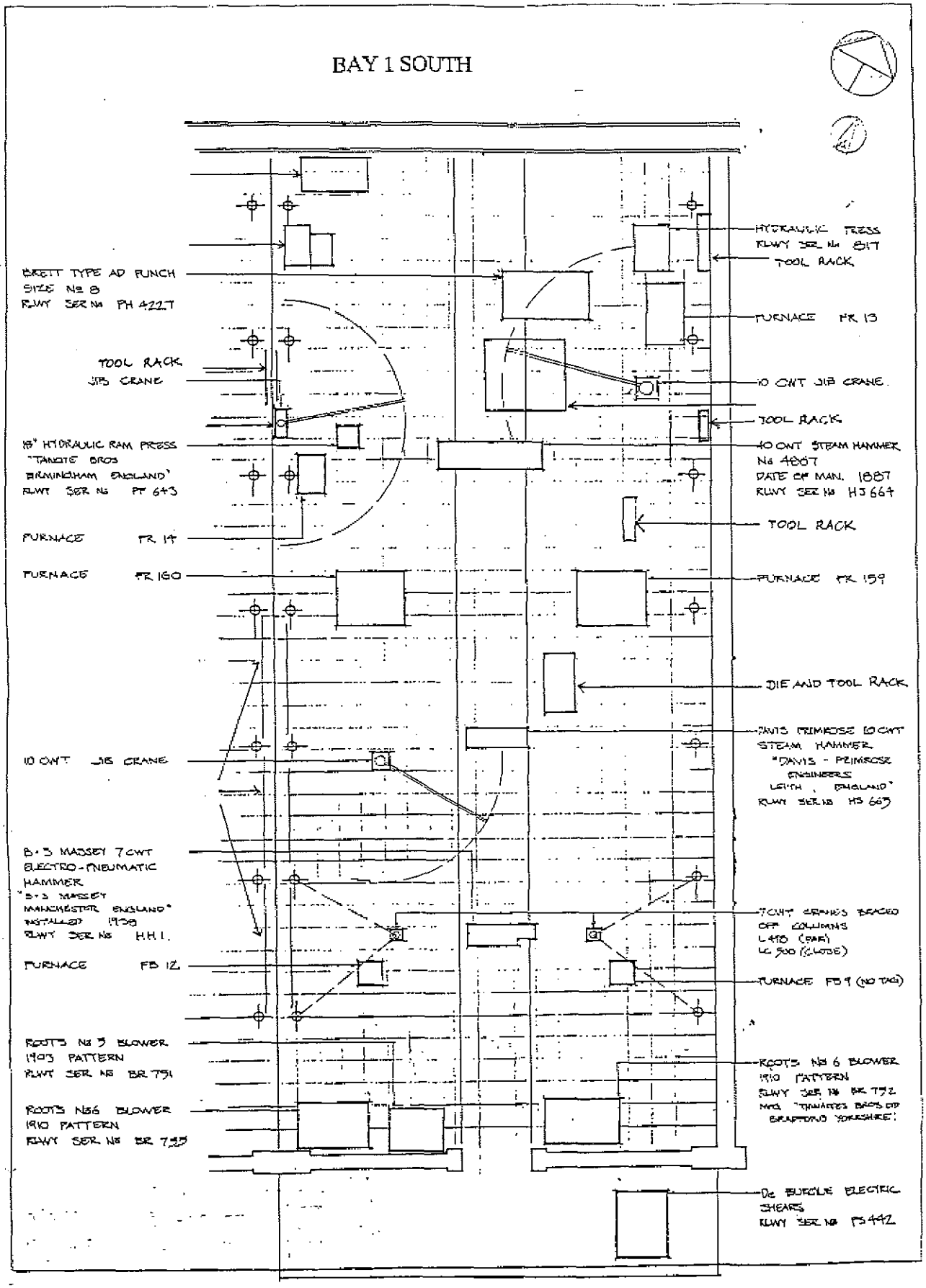
PLANS - MACHINERY LOCATION BAYS 1-4



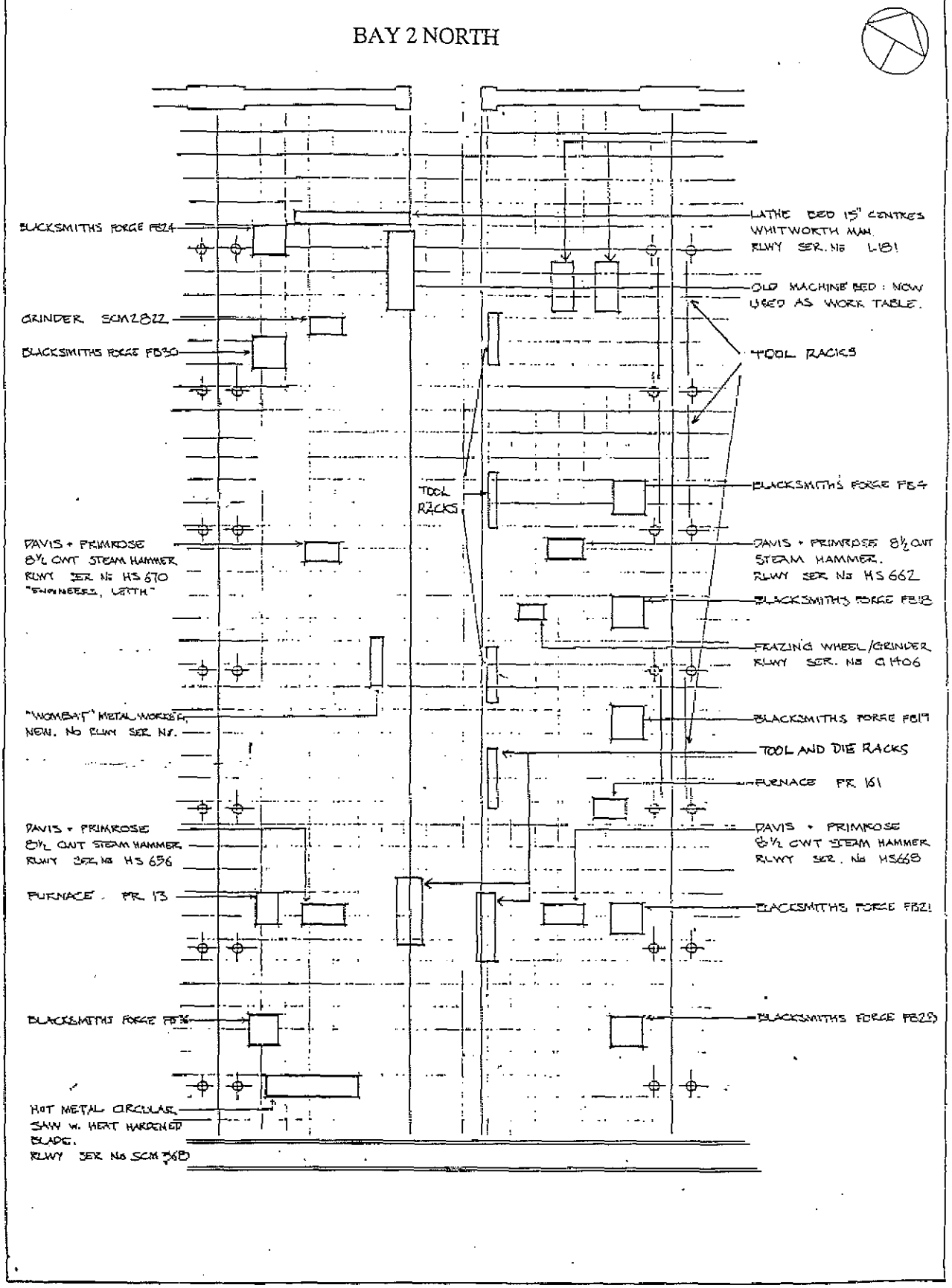
BAY 1 NORTH


OIL FIRED FURNACE FOR DAVY PRESS
RACKS OF TOOLS
WORK IN PROGRESS
RESERVOIR FOR DAVY PRESS. PH 819
DAVY 1500 TON STEAM OPERATED PRESS. 'DAVY BROS LTD SHEFFIELD ENGLAND 1920'
STEAM INTENSIFIER FOR DAVY PRESS PH 819
DAVY TOOLS AND DIES
STEAM RESERVOIRS FOR DAVY PRESS PH 819
RACKS OF TOOLS
DAVY BALANCE TONGS AND TOOLS

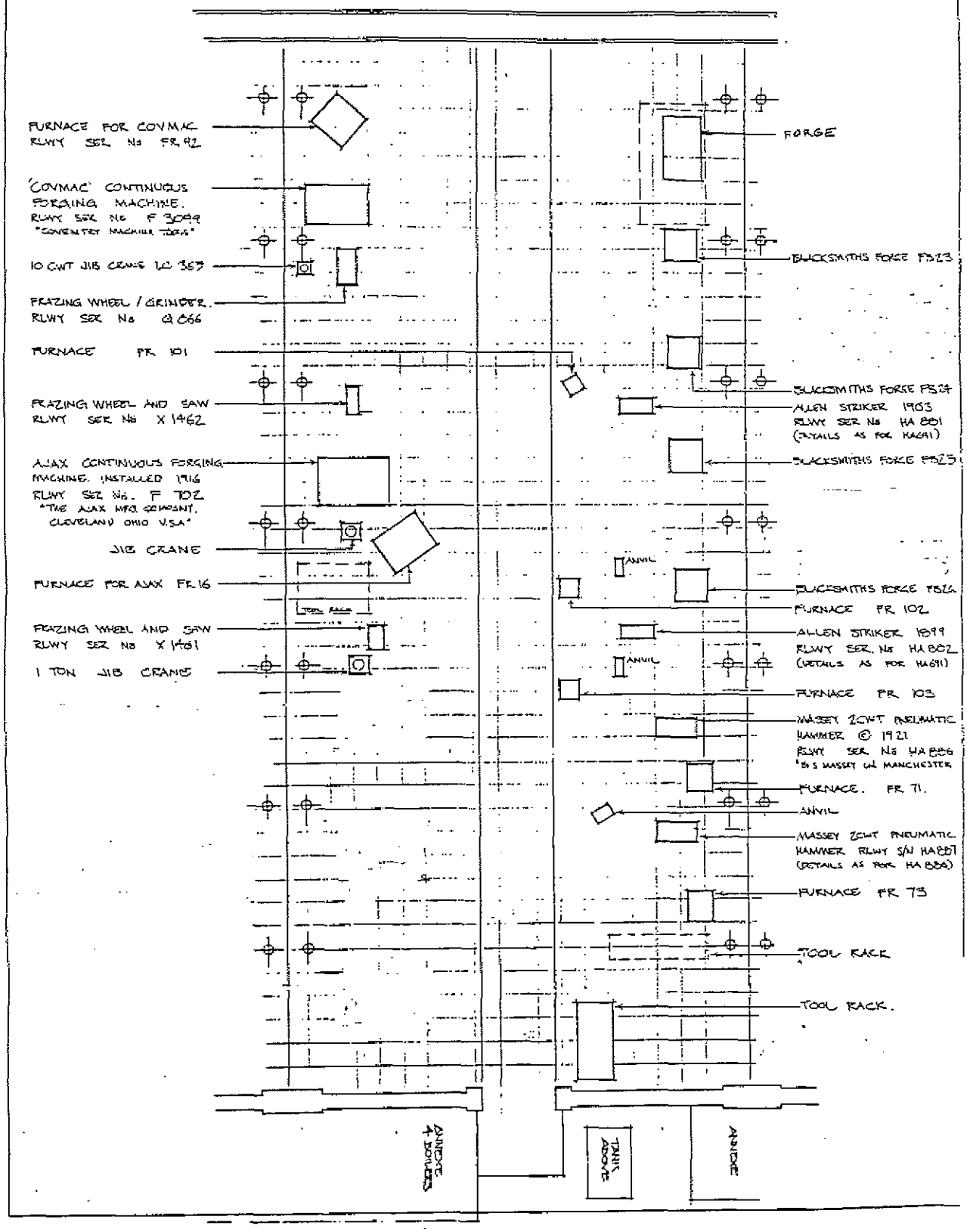
BAY 1 SOUTH


HYDRAULIC PRESS
RLWY SER No 811
TOOL RACK
BRETT TYPE AD PUNCH
SIZE No 8
RLWY SER No PH 4227
FURNACE FR 13
TOOL RACK
JIB CRANE
10 CWT JIB CRANE
TOOL RACK
18" HYDRAULIC RAM PRESS
"TANGYE BROS
BIRMINGHAM ENGLAND"
RLWY SER No PP 643
40 CWT STEAM HAMMER
No 4807
DATE OF MAN. 1887
RLWY SER No HS 664
TOOL RACK
FURNACE FR 14
FURNACE FR 160
FURNACE FR 159
DIE AND TOOL RACK
DAVIS PRIMROSE 50 CWT
STEAM HAMMER
"DAVIS - PRIMROSE
ENGINEERS
LEITH , ENGLAND"
RLWY SER No HS 667
10 CWT JIB CRANE
B·S MASSEY 7 CWT
ELECTRO-PNEUMATIC
HAMMER
"B·S MASSEY
MANCHESTER ENGLAND"
INSTALLED 1938
RLWY SER No H.H.I.
7 CWT CRANES BRACED
OFF COLUMNS
L 410 (DAVIS)
LC 500 (CLYDE)
FURNACE FB 12
FURNACE FB 9 (NO TAG)
ROOTS No 5 BLOWER
1903 PATTERN
RLWY SER No BR 751
ROOTS No 6 BLOWER
1910 PATTERN
RLWY SER No BR 752
MFD "TOWNLEYS BROS DIV
BRADFORD YORKSHIRE"
ROOTS No 6 BLOWER
1910 PATTERN
RLWY SER No BR 753
DE BURGUE ELECTRIC
SHEARS
RLWY SER No PS 442

BAY 2 NORTH


BLACKSMITHS FORGE FB24
GRINDER SCM2822
BLACKSMITHS FORGE FB30
DAVIS + PRIMROSE 8½ CWT STEAM HAMMER RLWY SER Nº HS 670 "SWINNEES, LEITH"
"WOMBAT" METAL WORKER NEW. No RLWY SER Nº.
DAVIS + PRIMROSE 8½ CWT STEAM HAMMER RLWY SER Nº HS 636
FURNACE PR 13
BLACKSMITHS FORGE FB36
HOT METAL CIRCULAR SAW w. HEAT HARDENED BLADE. RLWY SER Nº SCM 368
LATHE BED 15" CENTRES WHITWORTH MAN. RLWY SER. Nº L181
OLD MACHINE BED : NOW USED AS WORK TABLE.
TOOL RACKS
TOOL RACKS
BLACKSMITHS FORGE FB4
DAVIS + PRIMROSE 8½ CWT STEAM HAMMER. RLWY SER Nº HS 662
BLACKSMITHS FORGE FB18
FRAZING WHEEL/GRINDER RLWY SER. Nº C1406
BLACKSMITHS FORGE FB19
TOOL AND DIE RACKS
FURNACE PR 161
DAVIS + PRIMROSE 8½ CWT STEAM HAMMER RLWY SER. Nº HS668
BLACKSMITHS FORGE FB21
BLACKSMITHS FORGE FB29

BAY 2 SOUTH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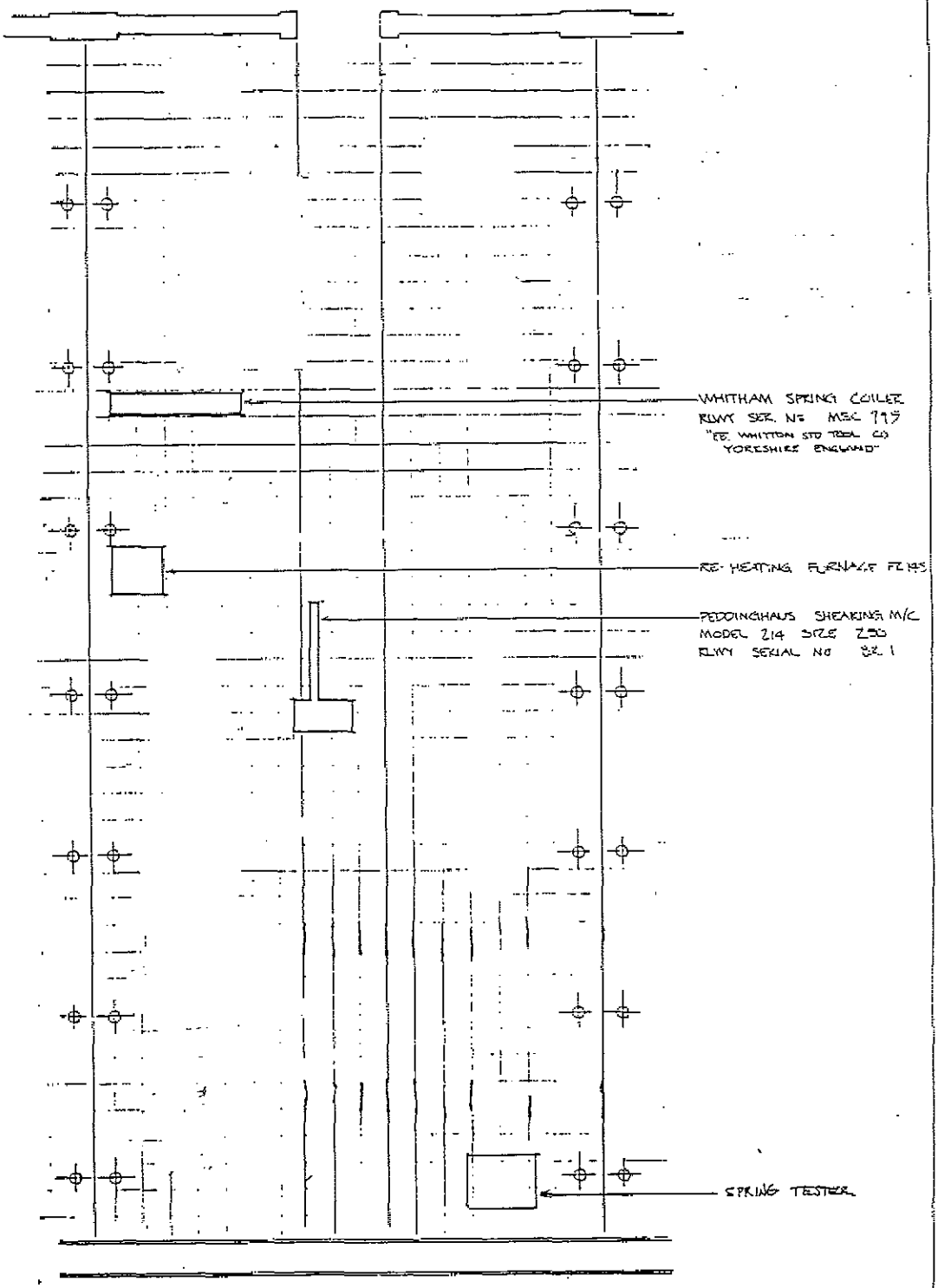
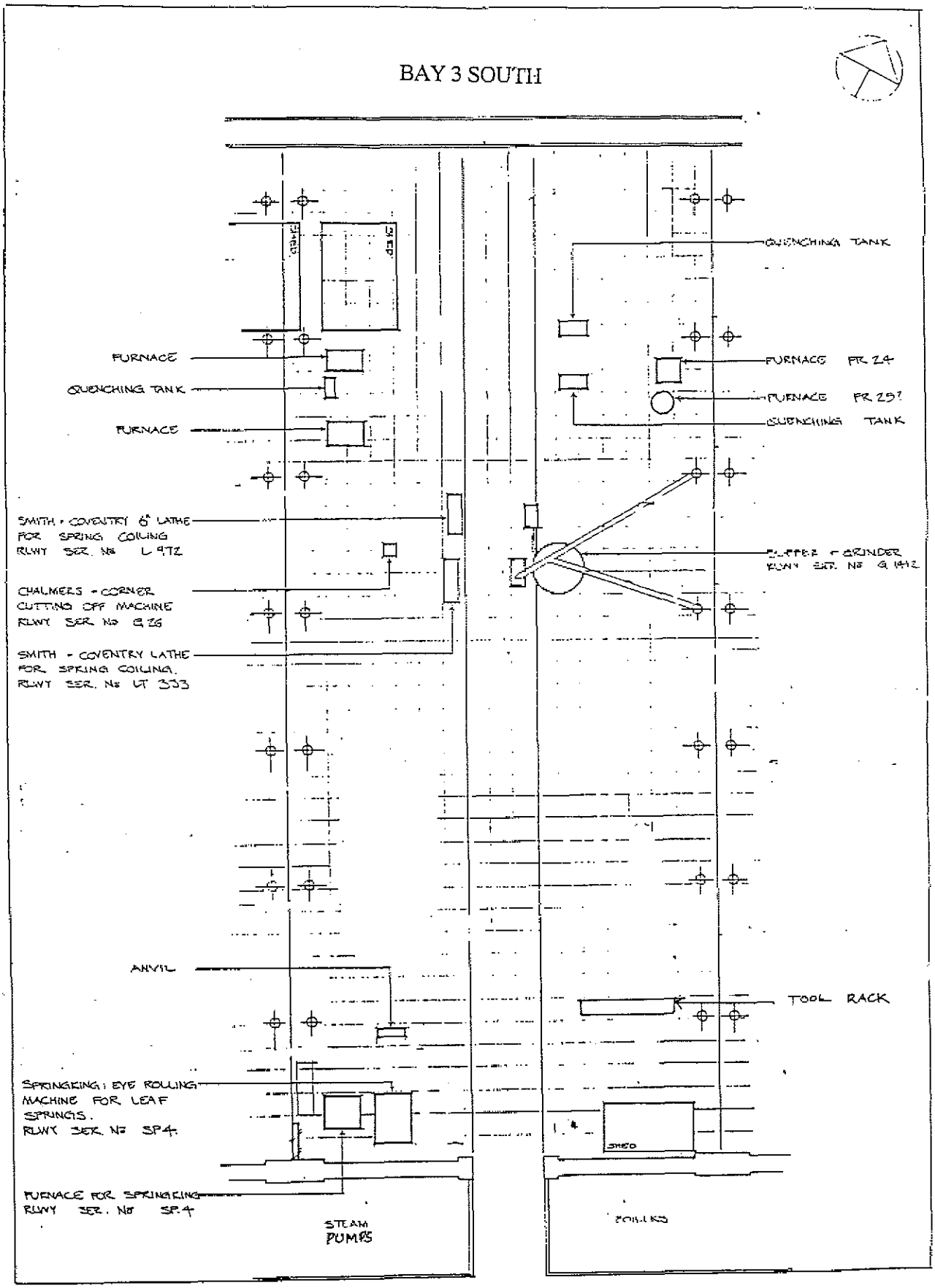
'COVMAC' CONTINUOUS FORGING MACHINE. RLWY SER No F 3049 "COVENTRY MACHINE TOOLS"
10 CWT JIB CRANE LC 367
FRAZING WHEEL / GRINDER. RLWY SER No @ 666
FURNACE FR 101
FRAZING WHEEL AND SAW RLWY SER No X 1462
AJAX CONTINUOUS FORGING MACHINE. INSTALLED 1916 RLWY SER No. F 102 "THE AJAX MFG COMPANY. CLEVELAND OHIO U.S.A"
JIB CRANE
FURNACE FOR AJAX FR.16
FRAZING WHEEL AND SAW RLWY SER No X 1461
1 TON JIB CRANE
FORGE
BLACKSMITHS FORGE FS23
BLACKSMITHS FORGE FS24
ALLEN STRIKER 1903 RLWY SER No HA 881 (DETAILS AS FOR HA691)
BLACKSMITHS FORGE FS25
ANVIL
BLACKSMITHS FORGE FS26
FURNACE FR 102
ALLEN STRIKER 1899 RLWY SER No HA 802 (DETAILS AS FOR HA691)
ANVIL
FURNACE FR 103
MASSEY 2CWT PNEUMATIC HAMMER © 1921 RLWY SER No HA 886 "B S MASSEY OF MANCHESTER
FURNACE. FR 71.
ANVIL
MASSEY 2CWT PNEUMATIC HAMMER RLWY S/N HA887 (DETAILS AS FOR HA 886)
FURNACE FR 73
TOOL RACK
TOOL RACK.
ANVIL
TENNIS ABOVE
ANVIL + BOLSTER

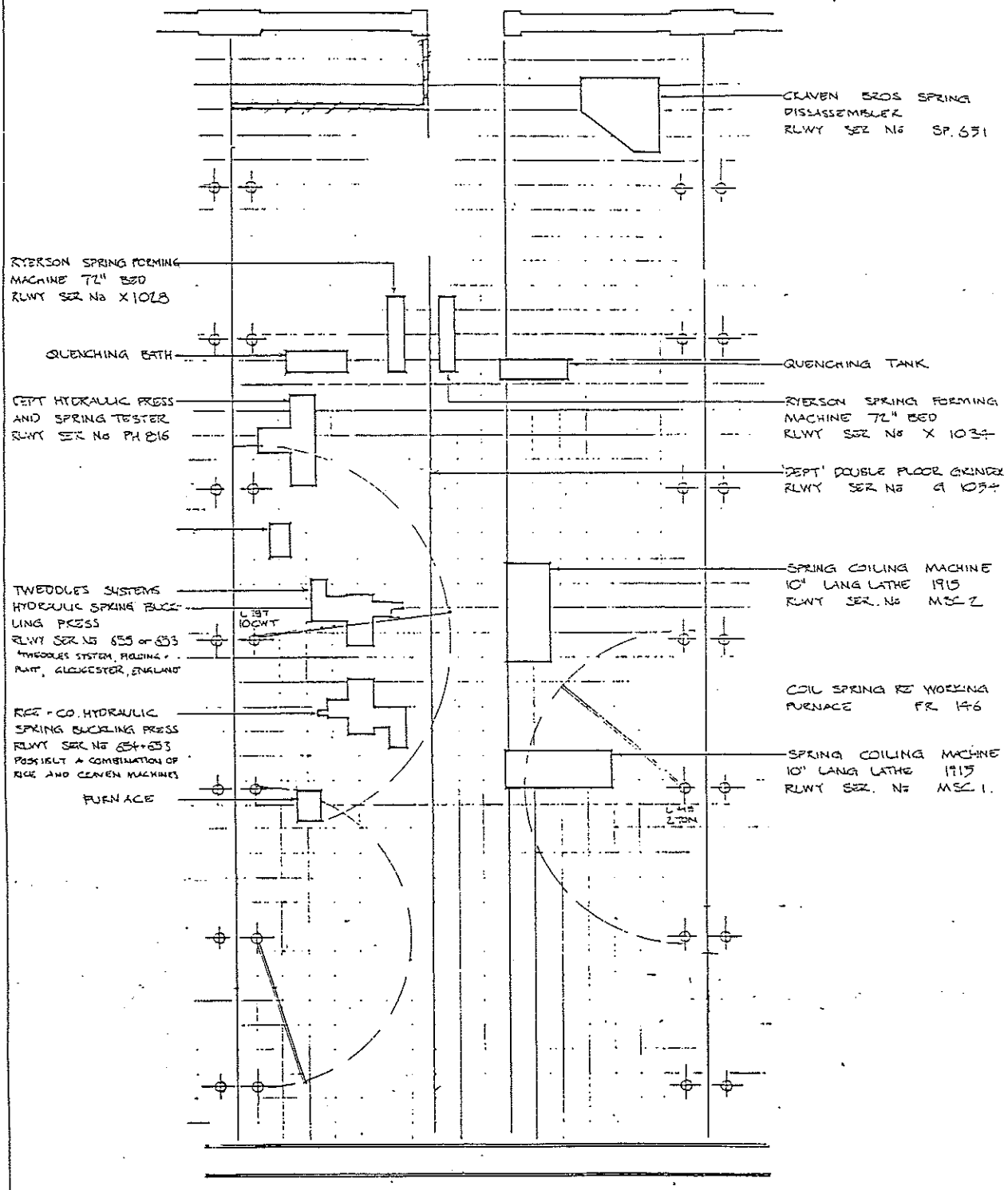
BAY 3 NORTH


WHITHAM SPRING COILER
RLWY SER. Nº MSC 719
"EE WHITTON STD TOOL CO
YORKSHIRE ENGLAND"
RE-HEATING FURNACE FE 195
PEDDINGHAUS SHEARING M/C
MODEL 214 SIZE 200
RLWY SERIAL NO SR. 1
SPRING TESTER

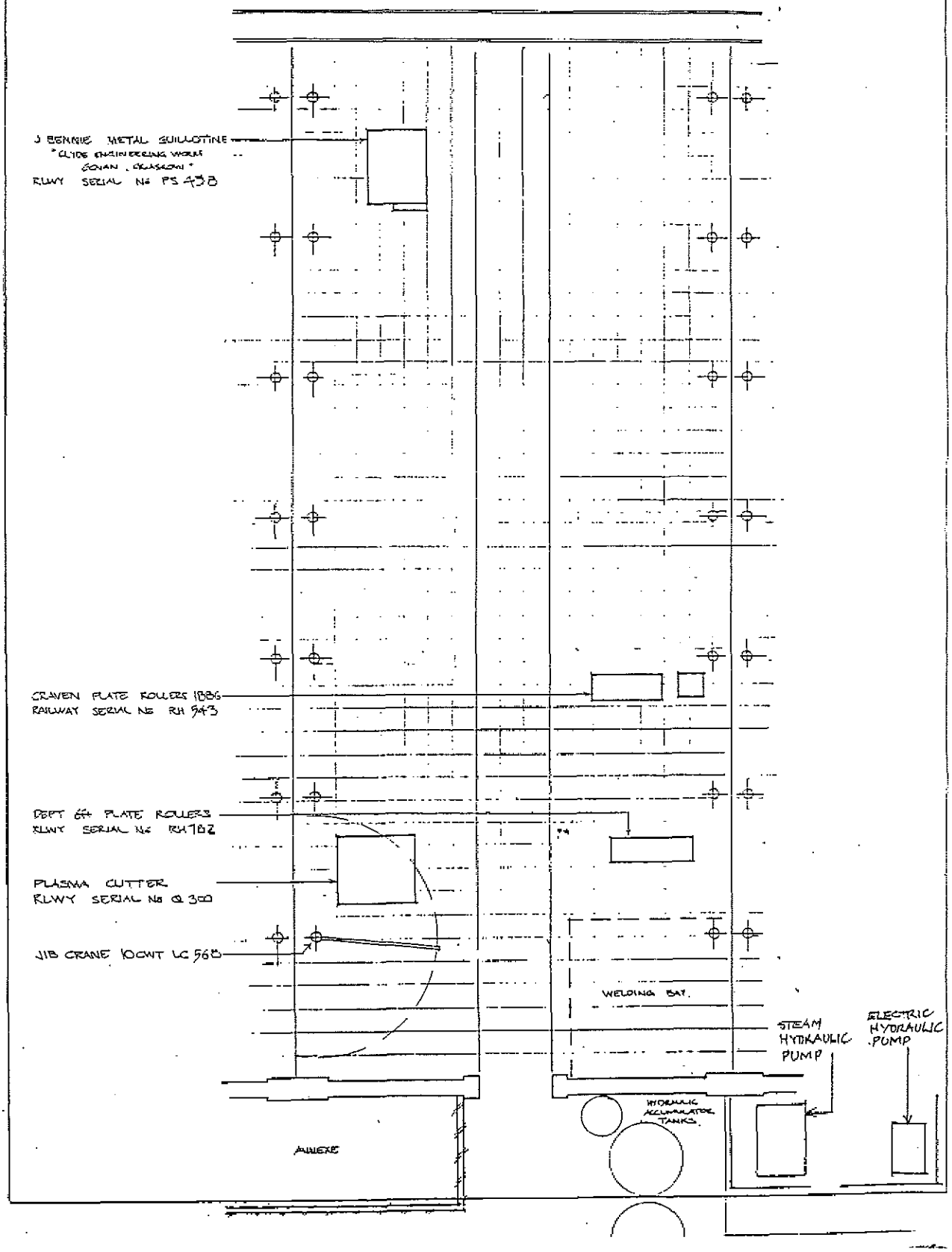
BAY 3 SOUTH


QUENCHING TANK
FURNACE
QUENCHING TANK
FURNACE
FURNACE FR 24
FURNACE FR 25?
QUENCHING TANK
SMITH + COVENTRY 6" LATHE FOR SPRING COILING RLWY SER. No L 972
CHALMERS + CORNER CUTTING OFF MACHINE RLWY SER No 9 26
SMITH + COVENTRY LATHE FOR SPRING COILING. RLWY SER. No LT 333
GRINDER RLWY SER. No 9 1912
ANVIL
TOOL RACK
SPRINGRING: EYE ROLLING MACHINE FOR LEAF SPRINGS. RLWY SER No SP4
FURNACE FOR SPRINGRING RLWY SER. No SP4
STEAM PUMPS
SHED

BAY 4 NORTH


CRAVEN BROS SPRING DISSASSEMBLER RLWY SER No SP. 651
RYERSON SPRING FORMING MACHINE 72" BED RLWY SER No X 1028
QUENCHING BATH
QUENCHING TANK
DEPT HYDRAULIC PRESS AND SPRING TESTER RLWY SER No PH 816
RYERSON SPRING FORMING MACHINE 72" BED RLWY SER No X 1034
DEPT' DOUBLE FLOOR GRINDER RLWY SER No G 1034
SPRING COILING MACHINE 10" LANG LATHE 1915 RLWY SER. No MSC 2
TWEEDDALES SYSTEMS HYDRAULIC SPRING BUCKLING PRESS RLWY SER No 653 or 653
"TWEEDDALES SYSTEM, FIELDING & PLATT, GLOUCESTER, ENGLAND"
L 19T 10CWT
COIL SPRING RE' WORKING FURNACE FR 146
RCE + CO. HYDRAULIC SPRING BUCKLING PRESS RLWY SER No 654+655 POSSIBLY A COMBINATION OF RCE AND CRAVEN MACHINES
SPRING COILING MACHINE 10' LANG LATHE 1915 RLWY SER. No MSC 1.
FURNACE
L 4T 5 2.73M

BAY 4 SOUTH


J BENNIE METAL GUILLOTINE
"CLYDE ENGINEERING WORKS
GOVAN, GLASGOW"
RLWY SERIAL No PS 438
CRAVEN PLATE ROLLERS 1886
RAILWAY SERIAL No RH 943
DEPT 64 PLATE ROLLERS
RLWY SERIAL No RH782
PLASMA CUTTER
RLWY SERIAL No Q 300
JIB CRANE 10CWT LC 565
WELDING BAY
STEAM HYDRAULIC PUMP
ELECTRIC HYDRAULIC PUMP
HYDRAULIC ACCUMULATOR TANKS
ANNEXE

APPENDIX B

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS

APPENDIX C

LIST OF PLANS

LIST OF PLANS

APPENDIX D

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