A Conservation Plan for the Works Managers Office Eveleigh Railway Workshops

Prepared for the Australian Graduate School of Engineering Innovation of the University of Sydney and the University of Technology Sydney

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I INTRODUCTION

The Works Managers Office lies within the curtilage of the Eveleigh Railway Workshops.

The heritage value of this building cannot be assessed without consideration of its relationship to the Workshops.

The Eveleigh Railway Workshops cover a site of 8 hectares close to the centre of Sydney at Redfern. The site is split by east west railway lines. The northern section is designated as the Carriage Workshops. The Works Managers Office lies in the southern side known as the Locomotive Workshops.

The Locomotive Workshops were used for the manufacture of heavy engineering works, the Carriage Workshops for general manufacturing and maintenance to the carriage wagons and vans of the NSW rail system.

Workshops construction was started in 1873 and officially opened in 1884.

In keeping with the Victorian era, the original functional industrial buildings are stone or brick laid in English bond with intricate architectural fenestration and detail.

The Works Managers office is rendered brick with intricate iron lacework. This building illustrates the strength, permanence and confidence of the Australians of the time in their expanding railway network.

Workshops constructions until 1910 were detailed with similar care. Later structures bear witness to the social and technical changes that happened in Australian society.

A comprehensive study has been done of the entire railway workshops with a detailed history of the establishment and development of the workshops. *ref. Eveleigh Railway Workshops Heritage Study by Don Godden & Associates 1986.*

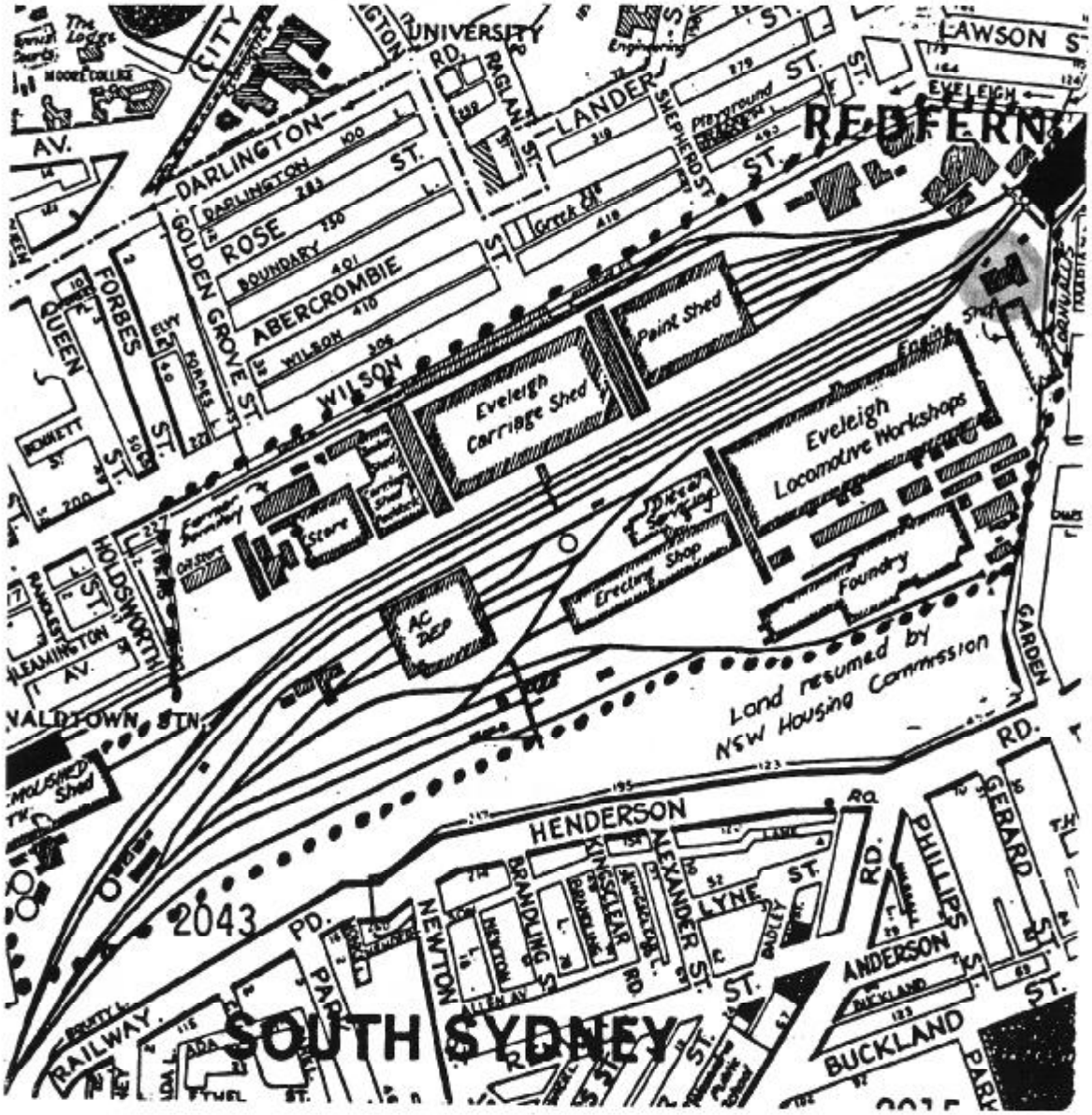
As a consequence three buildings, the Locomotive Workshops, the New Engine Shop, and the Works Managers Office have been designated heritage items and are listed in the National Trust Register as 'Classified'.

Brief

The aim of this report is to establish the cultural and architectural significance of the Works Managers Office and to form a conservation policy for the building.

Structure of the Report

This report follows the general structure as set out in J.S. Kerr, ***The Conservation Plan***, National Trust of Australia (NSW) Sydney 1982, ***Heritage Council of New South Wales Standard Format Guidelines for the Presentation of Reports***, and is consistent with the ICOMOS ***Guidelines to the Burra Charter - Conservation Policy*** (revised 23 April 1988).



Locality Plan
Fig. 1

II BRIEF DESCRIPTION OF THE BUILDING AND ITS PRESENT USAGE

Background

The building is currently occupied by the NSW State Rail Stores Department. The land ownership has been transferred from the NSW State Rail to the consortium of Sydney University, the University of NSW, the University of Technology, known as the Advanced Technology Park. It is proposed that Eveleigh Workshops be rezoned from Special Uses (railways) to a zoning that will allow the building of an Advanced Technology Park. It is proposed that the Works Managers Office house the Australian Graduate School of Engineering Innovation (AGSEI).

Boundaries of Study

The general curtilage of the site is defined by the Eveleigh Railway Yards. The site boundaries for the purposes of this Conservation Report are taken to be in the immediate vicinity of the building only.

III ACKNOWLEDGEMENTS

Gazzard Sheldon Architects acknowledges the help of the following people:

Victor Poljanski:	State Rail Senior Archivist
Don Hagerty:	State Rail Heritage Adviser
Ron Peck:	Historical Research Officer, Waterboard
Ken Paton:	State Rail Project Manager, Eveleigh

Part 1: THE CONSERVATION PLAN

1.1 BACKGROUND

1.1.1 The 'Burra' Charter

The Australian Icomos Charter for the Conservation of Places of Cultural Significance, known as the 'Burra' Charter, identifies the aim of conservation as retaining or recovering the cultural significance of a place as well as including provision for its security, maintenance and its future.

The process for implementing the aims of the *'Burra' Charter* are set out in the revised edition of *The Conservation Plan*, published by the National Trust of Australia (NSW) in 1985, and this report generally follows that scheme. The Burra Charter is attached as **Appendix 3.**

1.2 HISTORY OF THE WORKS MANAGERS OFFICE

1887 - Works Managers and Timekeepers Office was completed. The building functioned as the main timekeepers and administrative offices for the workshop from 1887 to 1986.

1922 - Works Managers Office and Timekeepers Office was extended on its western side (ref. site plan 1930)

1944 to 1947 - Major Extensions made to the Works Managers Office. The drawings Fig. 12-14 indicate a clock which does not appear in any of the photographs.

1976 to 1987 - Extensive repair and restoration work was carried out by the Workshop Modernisation Department of the NSW Railways.

The building was repainted in colours selected by the Stores Department Manager in 1992. The building was used from 1986 to the present date as administrative offices for the stores division of the NSW Railways.

1.3 ARCHITECTURAL DESCRIPTION

1.3.1 EXTERNAL DESCRIPTION

The Works Managers Office was constructed in 1887 with additions in 1922, 1944 - 1947 and is located in the Locomotive Workshop side of the Eveleigh Railway yards.

The two storey building is an almost symmetrically arranged in two blocks in a T-shape. The main block 30m x 14m is connected to a cross block approximately 25m x 12m. The two sections each have double hipped roofs.

The building is constructed of painted rendered masonry walls with ashlar coursing, and has rebated four pane timber sash type windows and stone sills (except in the 1944 additions), masonry chimneys, corrugated iron bullnosed verandah with cast iron posts and decorative cast iron lacework.

In 1887 the two storeyed central double hipped bay was constructed with an encircling bullnosed corrugated iron verandah. The roof was penetrated by masonry chimney stacks and an intricate masonry and cast iron bell tower was located at the western end of the building.

In 1922 the western end of the building was extended, thereby centralising the bell tower. The bullnosed verandah was continued all round. The double hipped roof, and general building fenestration was also extended.

In 1944 - 47 extensions expanded the administrative office areas through internal alterations and the substantial extension of the building at the eastern end.

The original stair was removed from the central bay. Offices were added to the western end of the first floor in 1922 to form an open plan office. The new eastern end extension was also an open plan office. A new stair was added. Externally part of the 1887 verandah was demolished. The addition adopted the fenestration and style of the existing building.

The building restoration was initiated in 1976 and continued to be carried out by the Workshop Modernisation Unit during slack periods in the workshop.

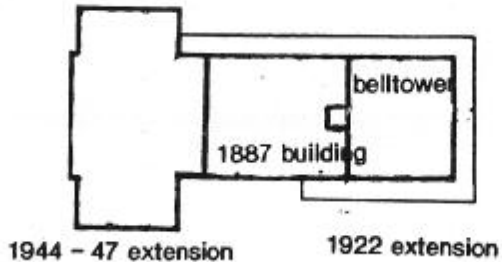
Work carried out included replacement of, and repair work to, the cast iron lacework, replacement of the verandah and the removal of fire places. The bell was finally reinstated in 1987.

Materials

- Painted, rendered masonry walls with ashlar coursing.
- Rebated window openings with four pane sash type, timber windows and stone sills.
- Corrugated iron roofing and masonry chimneys
- Bullnosed corrugated iron verandahs with cast iron posts and iron lace roofing.

1.3.2 INTERNAL DESCRIPTION IN 1992

Significant alterations have taken place internally. The building has more than doubled its original size and the only remnants of the 1887 building include the timber ceiling, a few doors, some of which have been altered, internal sills and door thresholds. The 1922 extension retains its corrugated metal ceiling and doors. Cedar cupboards from 1922 were removed in the 70's from the offices, and their location is unknown. The fire places were blocked in at some stage following the 1944 extensions. The 1944 extension remains largely intact.



1.4 ASSESSMENT OF SIGNIFICANCE

1.4.1 BASIS OF ASSESSMENT

Section 1.4.2 below summarises the items of cultural significance noting the reasons for significance. The Conservation Plan recognises that the significance of the Works Managers Office lies in its physical form and the part it has played in the Eveleigh Railway Workshops.

1.4.2 STATEMENT OF CULTURAL SIGNIFICANCE

Historical Significance

The Eveleigh Railway Workshops are significant in their importance to the development of transport in NSW. The Works Managers office significance is relative in this context.

Architectural Significance

The original Works Managers office was built in the late Colonial Georgian style. It was a rendered brick building with verandahs and a double hipped corrugated iron roof with an interesting cast iron belltower.

Subsequent extensions of 1922, 44-47 have substantially altered the size of the building. The building has expanded in line with the growth of the workshops. These extensions have been carried out sympathetically toward the original structure copying much of the detailing.

1.4.3 SCHEDULE OF ITEMS OF SIGNIFICANCE

(i) External Features

- The entire cast iron belltower, bell and all ornamental detail.
- The double hipped roof and chimneys
- The verandah, including the iron lacework and brackets, though not entirely original is in keeping with the building style.

(ii) Internal Features

- Differences in the internal ceilings from the 1887 timber to the corrugated metal, and 1944 plaster are of interest.
- Internal fire places have been removed.
- Generally the building is in good physical repair as a result of continued maintenance by the workshops.

1.5 CONSERVATION POLICY

1.5.1 EXPLANATION

This conservation plan, arising from the Statement of Significance, is to be used as a guide, with a view toward future alterations.

1.5.2 TERMINOLOGY

The following definitions taken from the Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (Burra Charter) have been used in this report.

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 circumstances include preservation, restoration, reconstruction 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 it 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 this Charter.

Adaptation means modifying a place to suit proposed compatible uses.

Compatible use means a use which involves no change to the culturally significant fabric, changes which are substantially reversible, or changes which require a minimal impact.

To which may be added:

Furnishings - all removable items including sculpture, furniture, coverings, hangings, artificial vegetation and artifacts.

1.5.3 CONSTRAINTS ARISING FROM ARCHITECTURAL AND CULTURAL SIGNIFICANCE

Other than the relevance the building has through its relationship to the workshops, it has limited architectural heritage value.

The bell tower is unusual and interesting, especially in the role it played to the workshops. The building fenestration is in keeping with the Victorian Workshops.

In this context it is recommended that the external character be retained. This includes keeping:

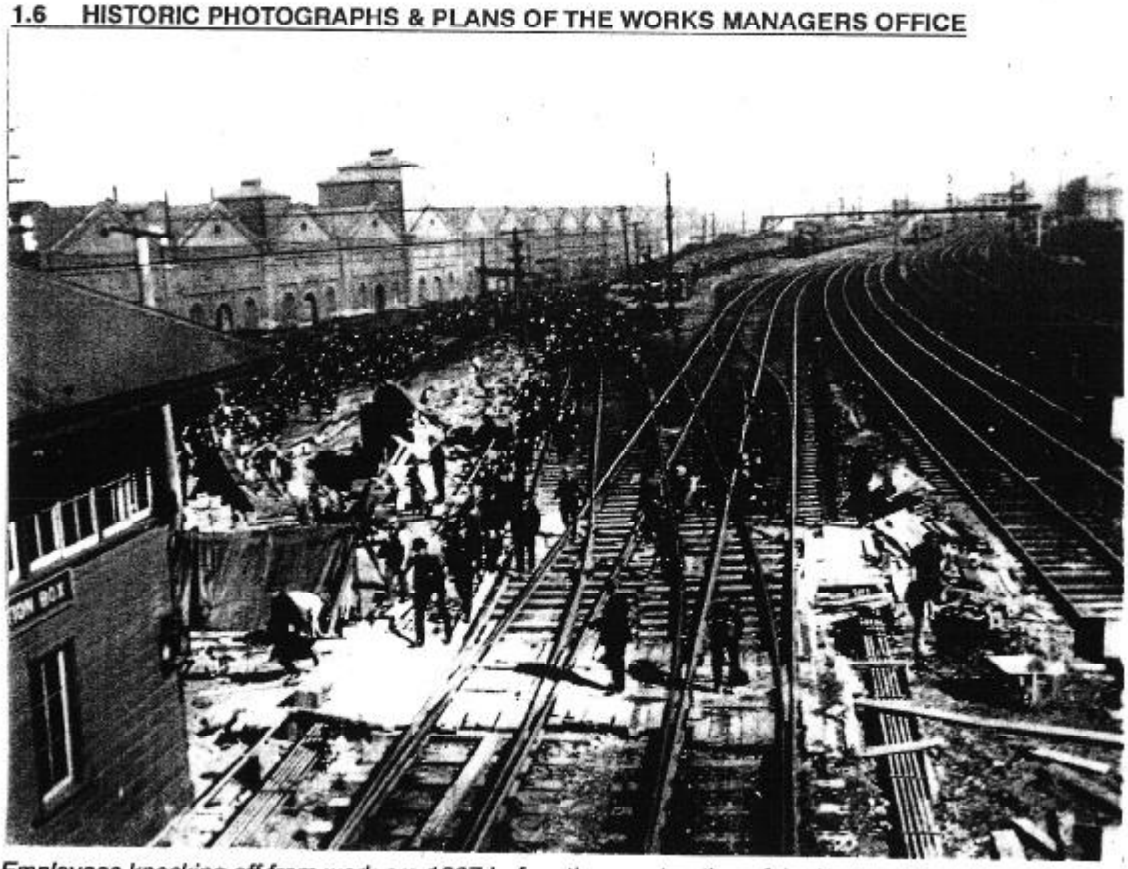
- The bell tower and bell.
- Double hipped roof form.
- The bullnosed corrugated iron verandah.
- Cast iron columns, capitals and lace work.
- The ashlar coursing.
- Paned windows.
- Verandah corner brackets.

Internally items of interest include:

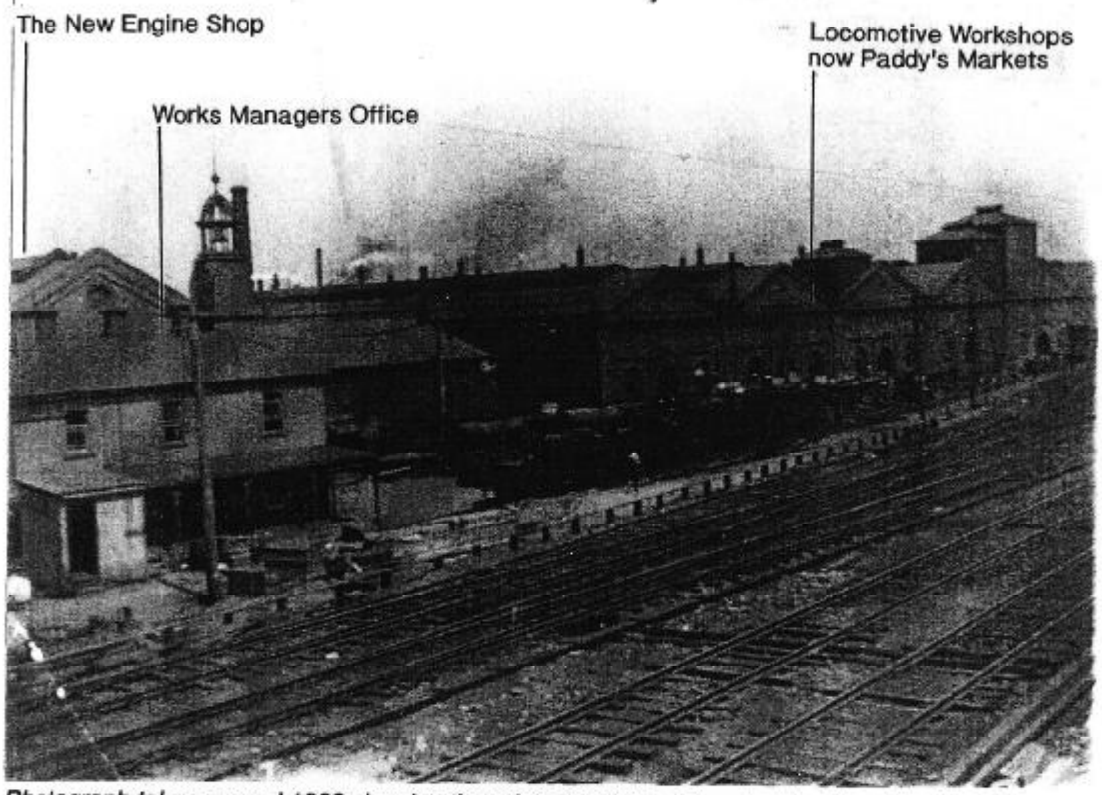
- The clocktower ladder.
- Door thresholds.
- Corrugated metal ceilings.
- Air pressure guage

However, as the alterations have had substantial impact on the building fabic and there are no features of outstanding interest remaining, there are no internal items recommended for permanent retention.

1.6 HISTORIC PHOTOGRAPHS & PLANS OF THE WORKS MANAGERS OFFICE



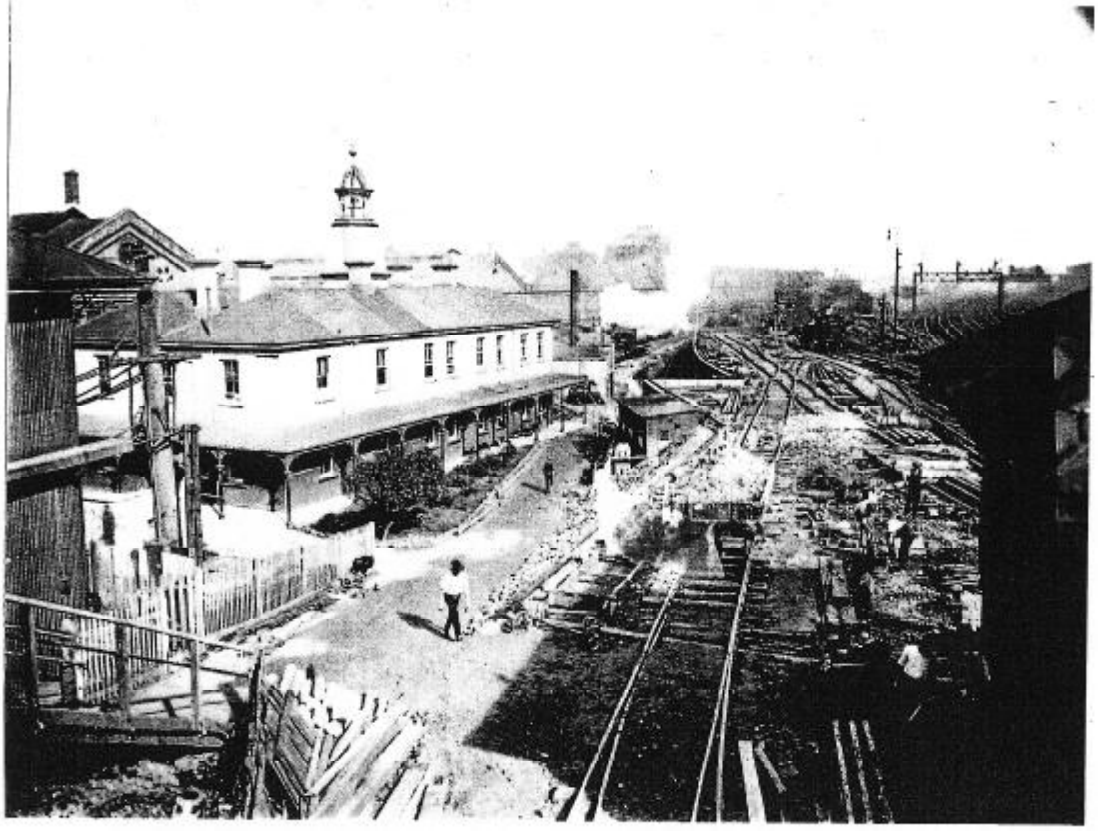
Employees knocking off from work pre 1887 before the construction of the Works Managers Office. The site of the office is to the left of the photo.
Fig 2



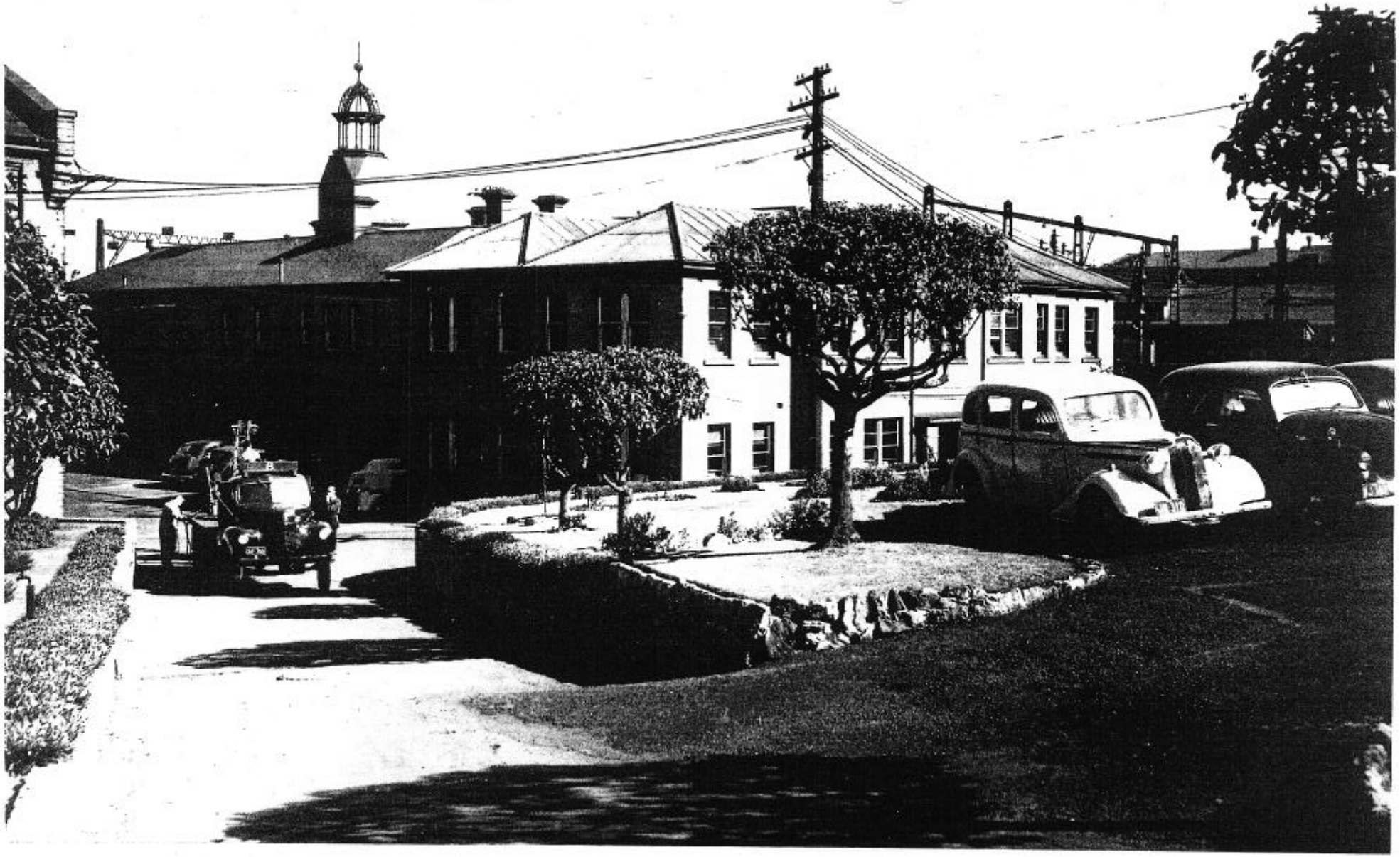
Photograph taken around 1900 showing the original building. The double hipped roof structure with belltower on the western end was completely encircled by its verandah. The Manager's office was constructed shortly after the locomotive workshops to the right of the photograph.

Fig 3

Photograph taken around 1900 clearly showing the relationship between the Works Managers Office to the south of the railway tracks as part of the locomotive workshops and the carriage workshops to the north of the railway lines. A paling fence has been constructed between the building and the railway line.
Fig 4



Taken between 1922 and 1928 during the construction of the Illawarra line, this photo shows the 1922 extension of the Works Managers Office. The building was extended significantly to the west, thereby centralising the bell tower and the verandah was continued all round the building. Detailing from the original building was copied in the extension. The paling fence has been removed and a picket fence installed. The eastern most wall and verandah was removed in the 1944 alterations. Two skylights have been placed in the verandah roof. No awnings have been added to the building at this stage. The western end verandah post is still intact.
Fig 5



The Works Managers Office Eveleigh in 1952. Note the carriage turning circle to the left of the photo and the absence of the bell.
The roof on the 1944 addition appears to be of a different material. Note the windows to the 1944 addition have a different fenestration. Note also the vents are simplified versions of the earlier vents used elsewhere.
Fig 6

1968 Works Managers Office. Note the absence of the bell which was taken down before the war and stored inside the bell tower. Note that awnings have been added over two windows on the upper level. Note the ground floor windows to the 1887 central bay have been enlarged and the fenestration altered. The building has been repainted to a more monochromatic scheme.
Fig. 7

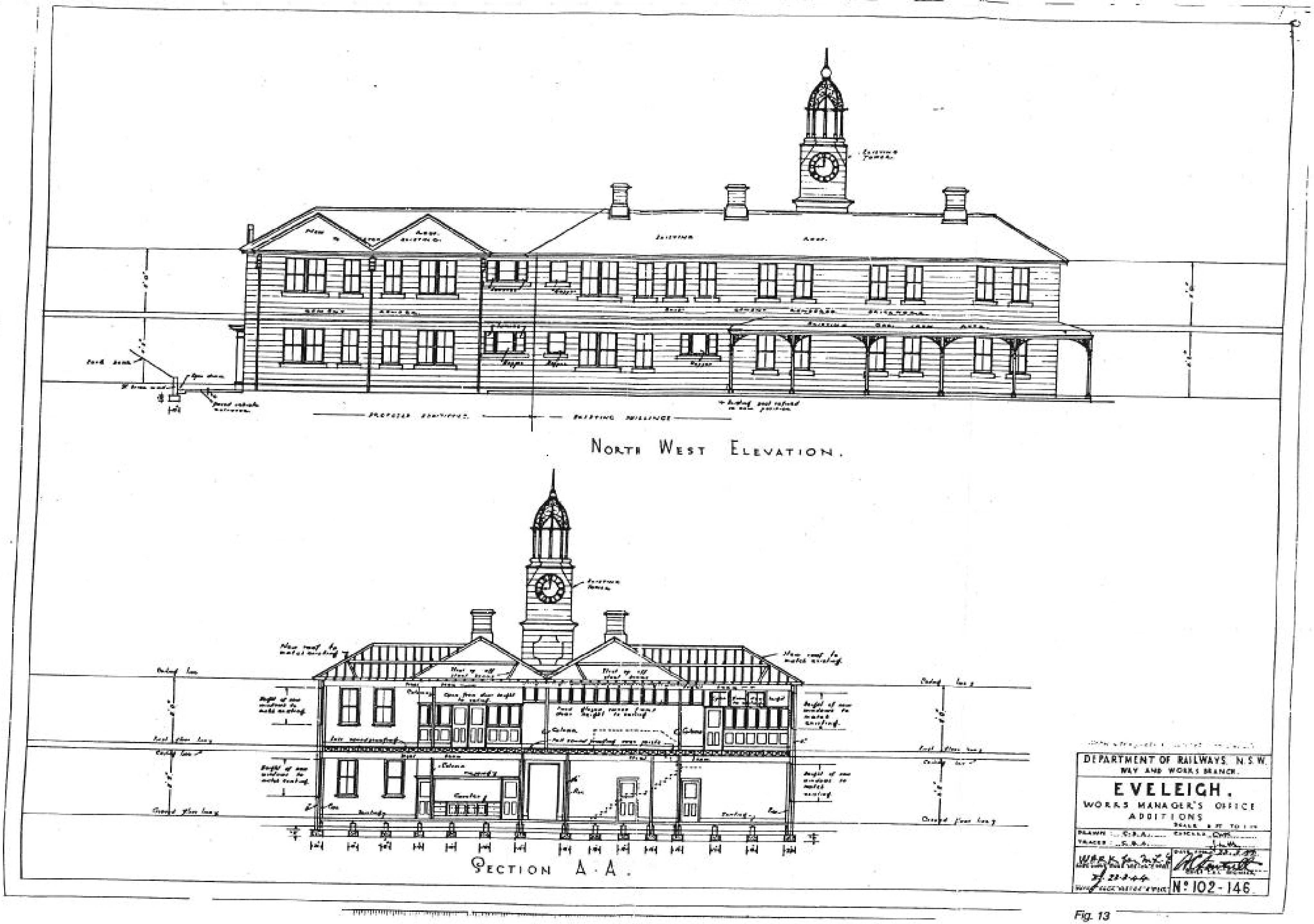

North West Elevation.
Section A·A.
Department of Railways. N.S.W.
Way and Works Branch.
Eveleigh.
Works Manager's Office
Additions
Nº 102-146.

Fig. 13

Fig. 8
Site Plan 1867
Showing the original configuration
of the Works Managers Office

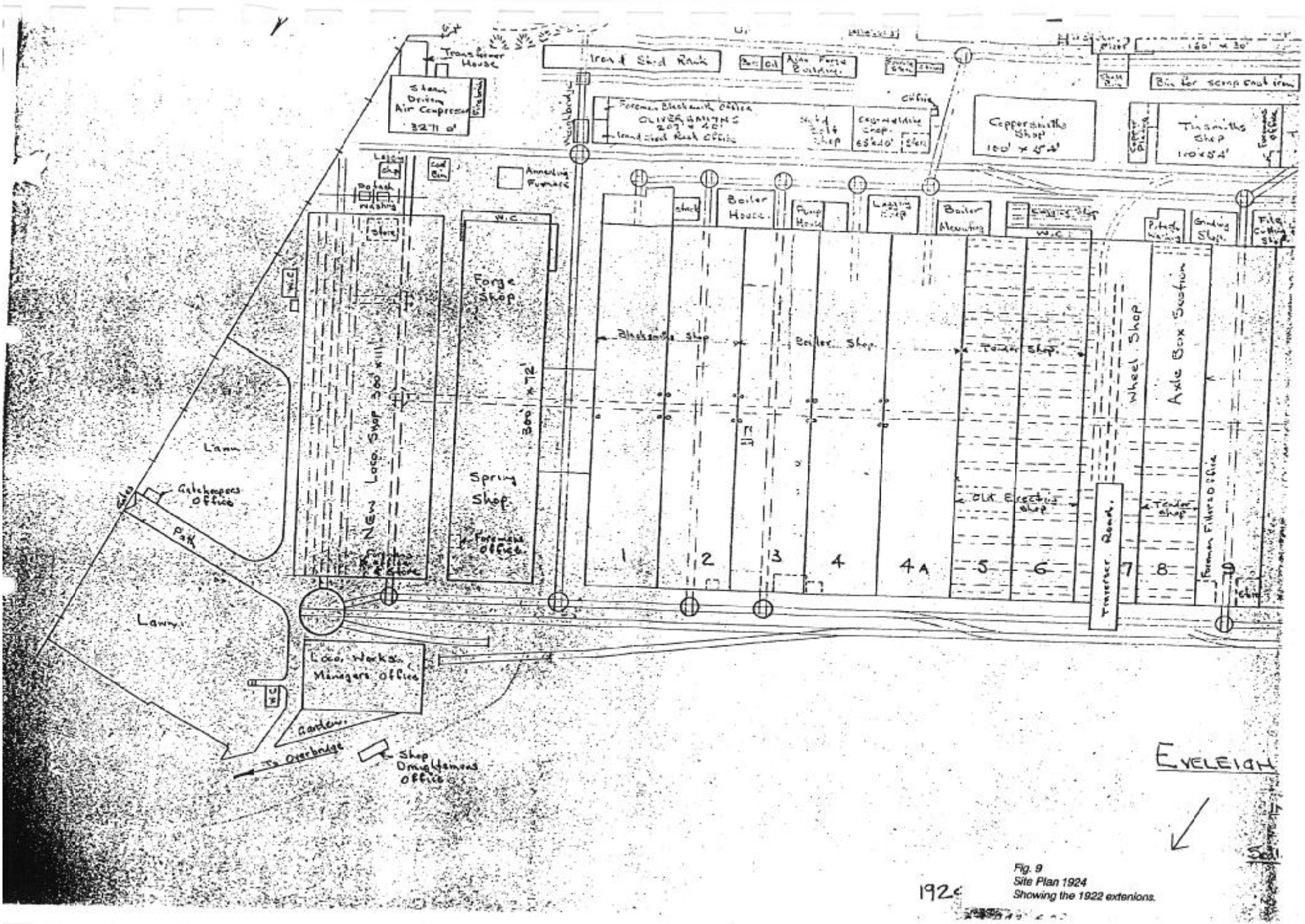


Fig. 9
Site Plan 1924
Showing the 1922 extensions.

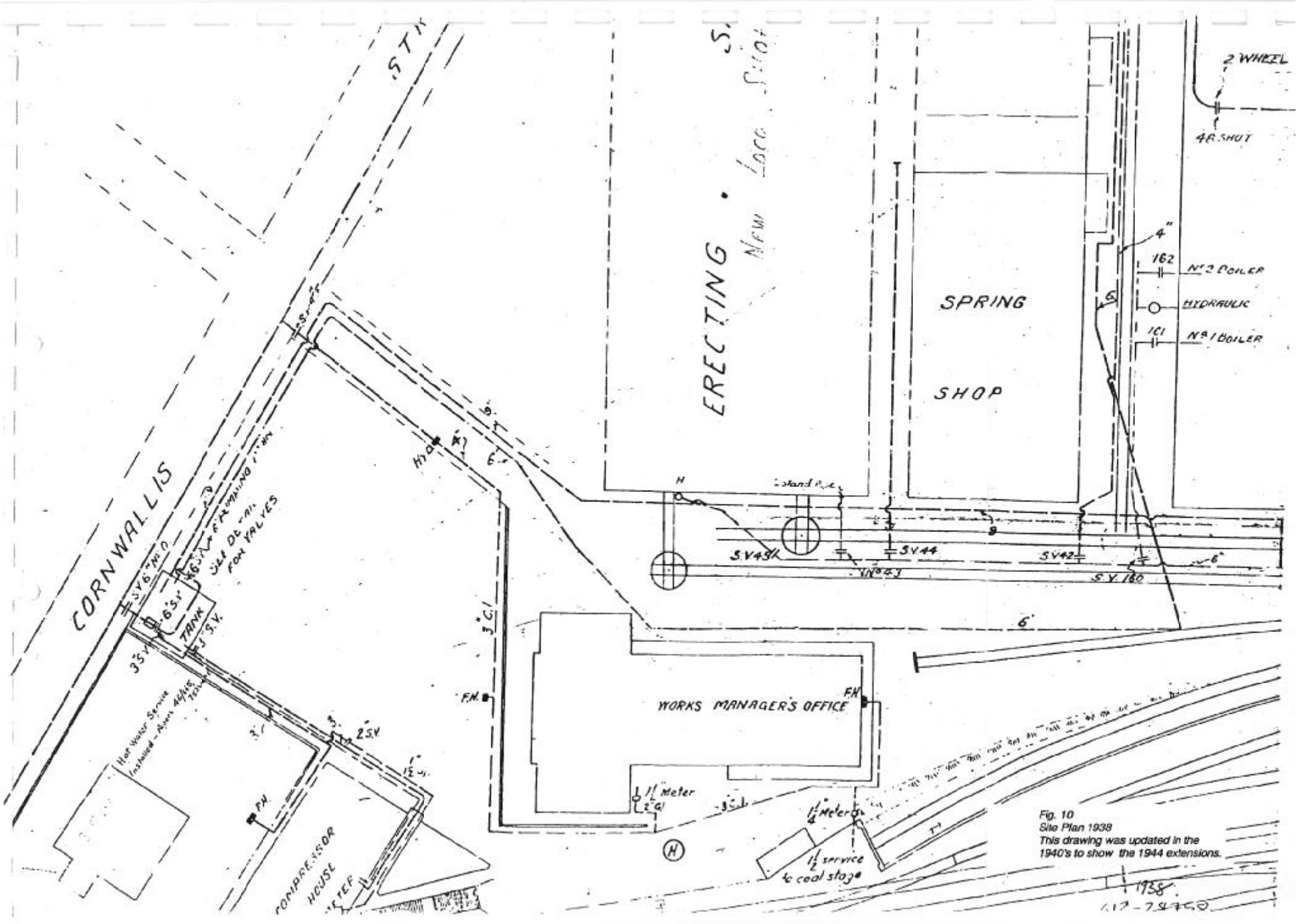
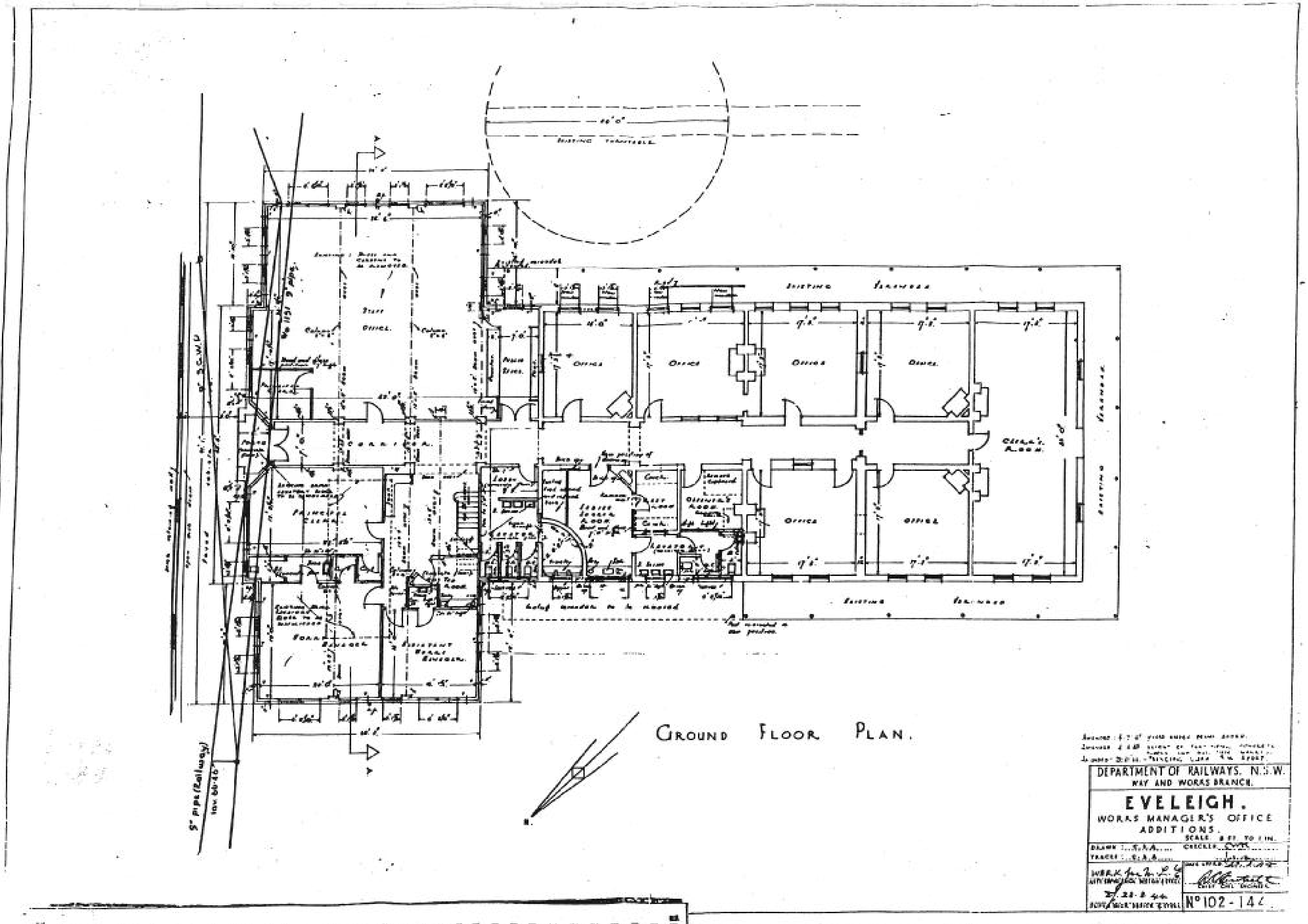
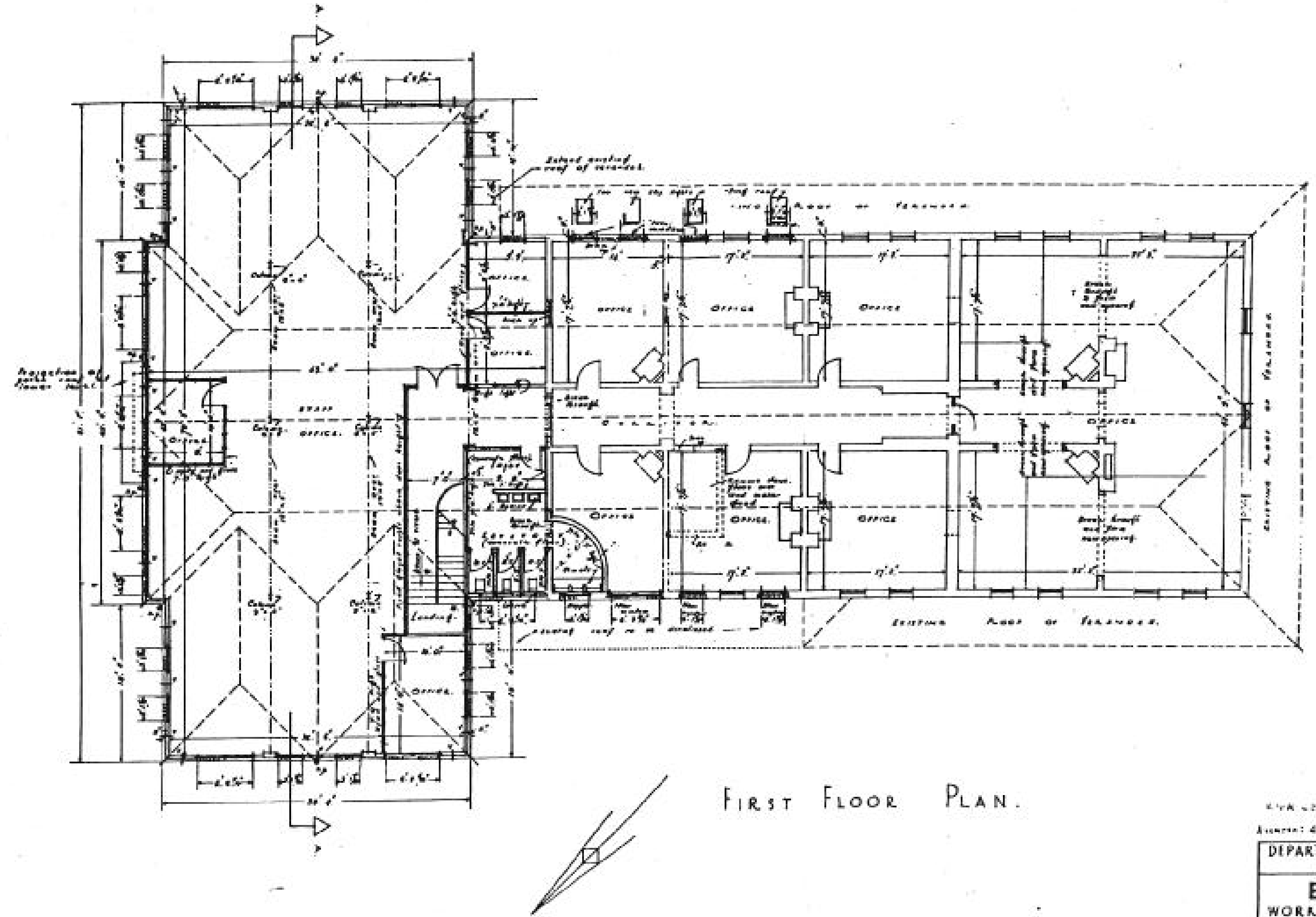


Fig. 10
Site Plan 1938
This drawing was updated in the 1940's to show the 1944 extensions.



GROUND FLOOR PLAN.
DEPARTMENT OF RAILWAYS. N.S.W.
WAY AND WORKS BRANCH.
EVELEIGH.
WORKS MANAGER'S OFFICE
ADDITIONS.
Nº 102-14
Staff Office.
Office
Clerk's Room
Existing Verandah
9" pipe (Railway)

Fig. 11



FIRST FLOOR PLAN.

DEPARTMENT OF RAILWAYS. N.S.W.
WAY AND WORKS BRANCH

EVELEIGH.
WORKS MANAGER'S OFFICE
ADDITIONS.

SCALE: 8 FT. TO 1 IN.

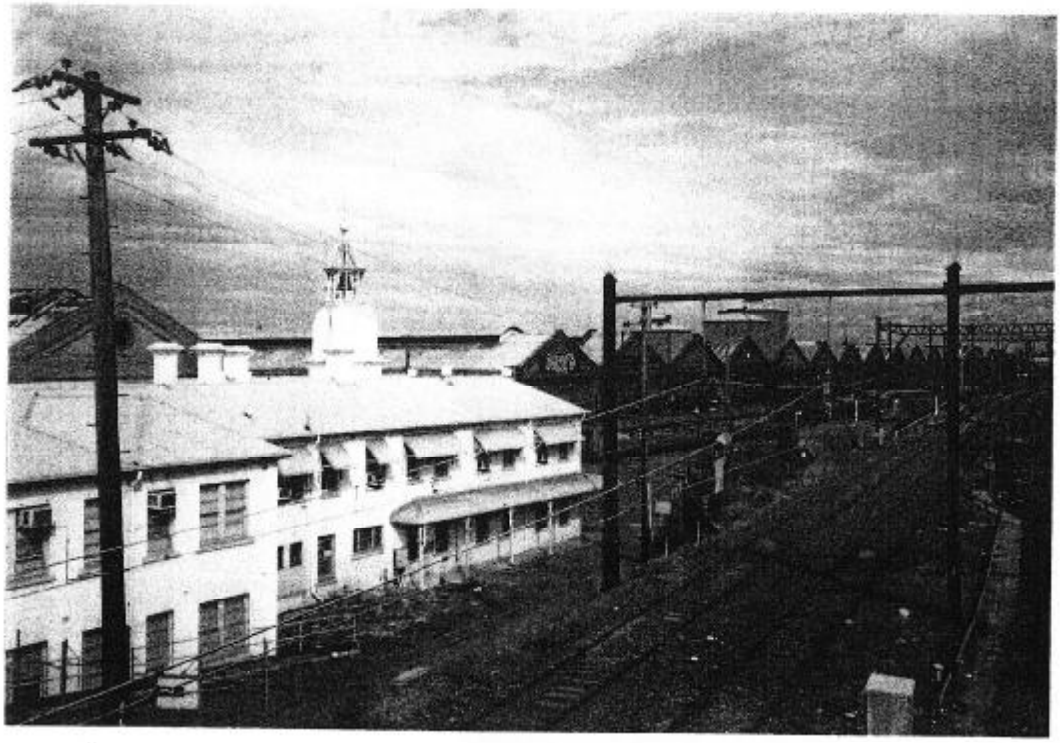
DRAWN ... S.S.A. ... CHECKED ...
TRACED ... S.S.A. ...

CHIEF CIVIL ENGINEER

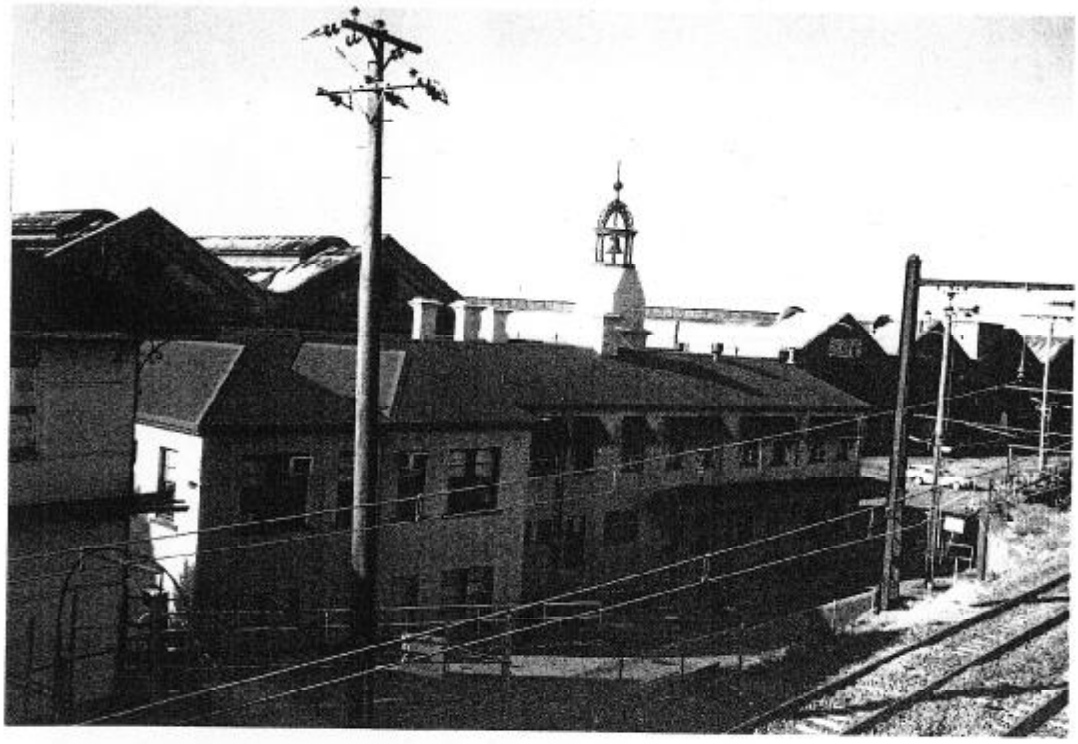
Nº 102-145.

Fig. 12

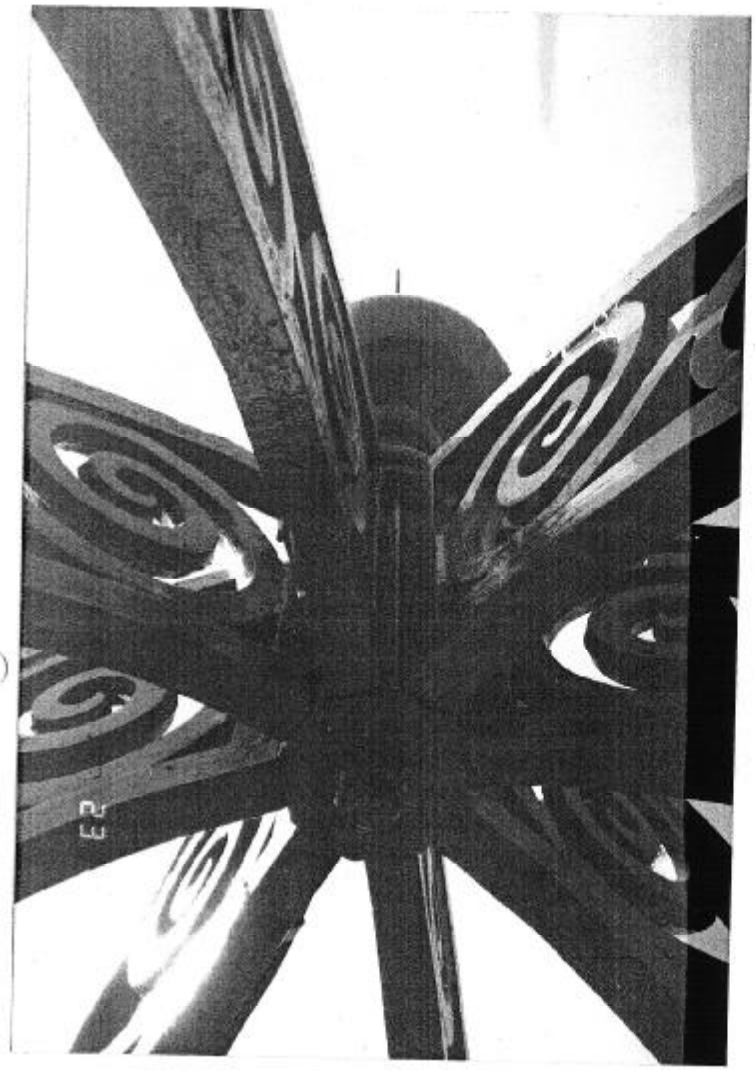
1.7 PHOTOGRAPHIC RECORD OF THE BUILDING IN 1992



The building prior to the recent repainting. Note that awnings have been added over all the upper windows in the central and western sections of the building since 1968. Windows to the ground floor have been altered again. Air conditioners, security grills and PVC downpipes have been added.
Fig. 14



The building following the recent repainting.
Fig. 15



Extensive repair work to the bell tower was carried out from 1976 to 1987.
The bell had been stored inside the tower during World War 2 up until 1976.
The crane being used to reinstate the bell in 1987 was resting on the site of the covered in carriage turntable. The crane collapsed into the hole, dropping the bell through the first floor roof. Note the two bell ringers.
Fig. 16

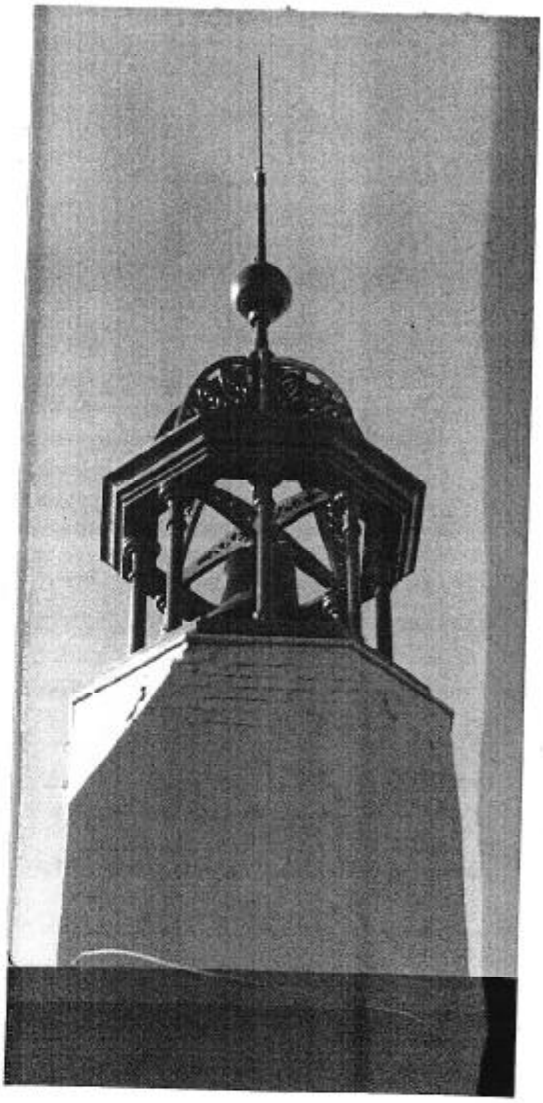
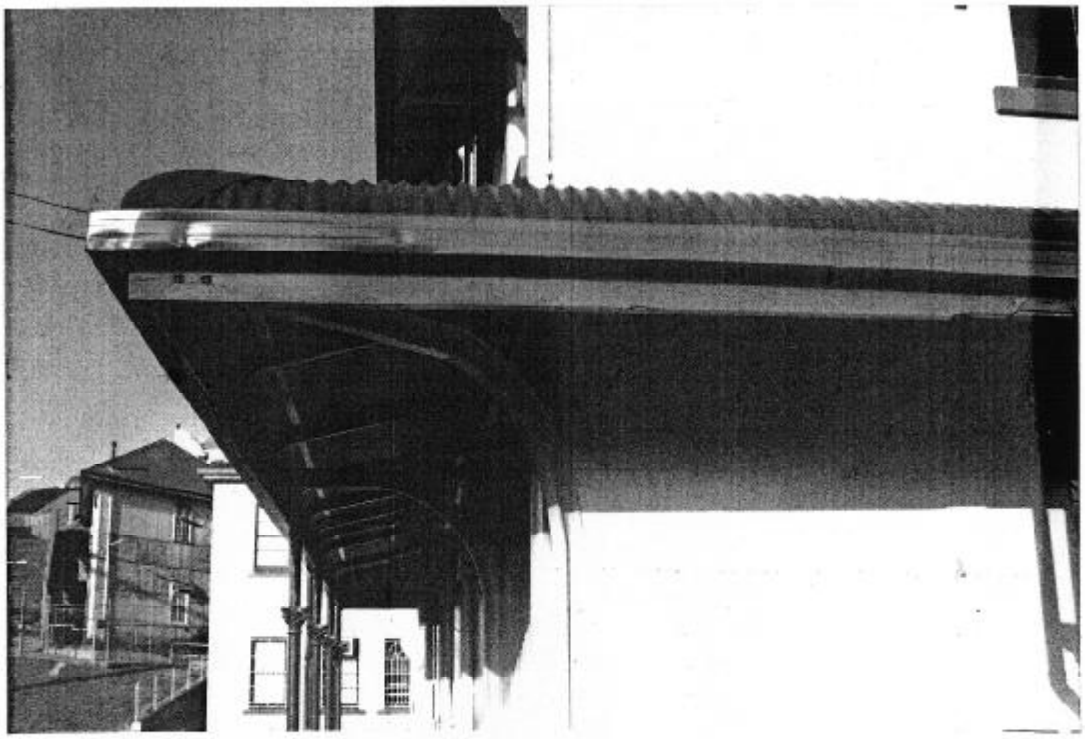


Fig. 17

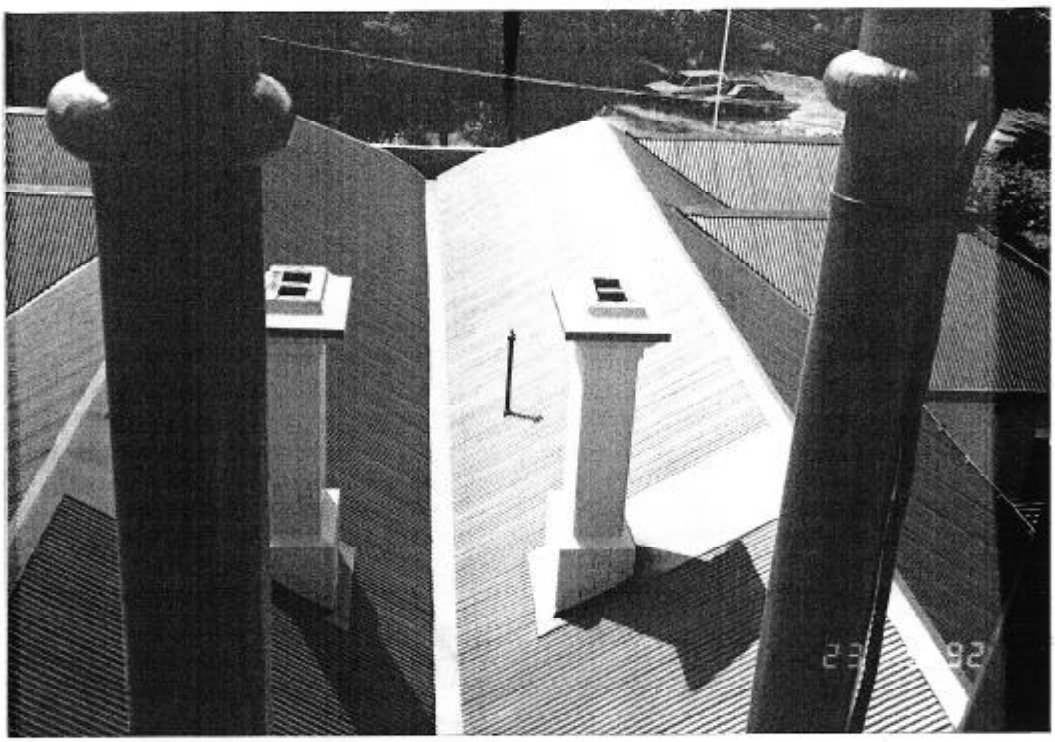
The western elevation has remained largely unchanged since the 1922 addition, except for the awnings over the windows which are believed to have been added after 1968.
Fig. 20



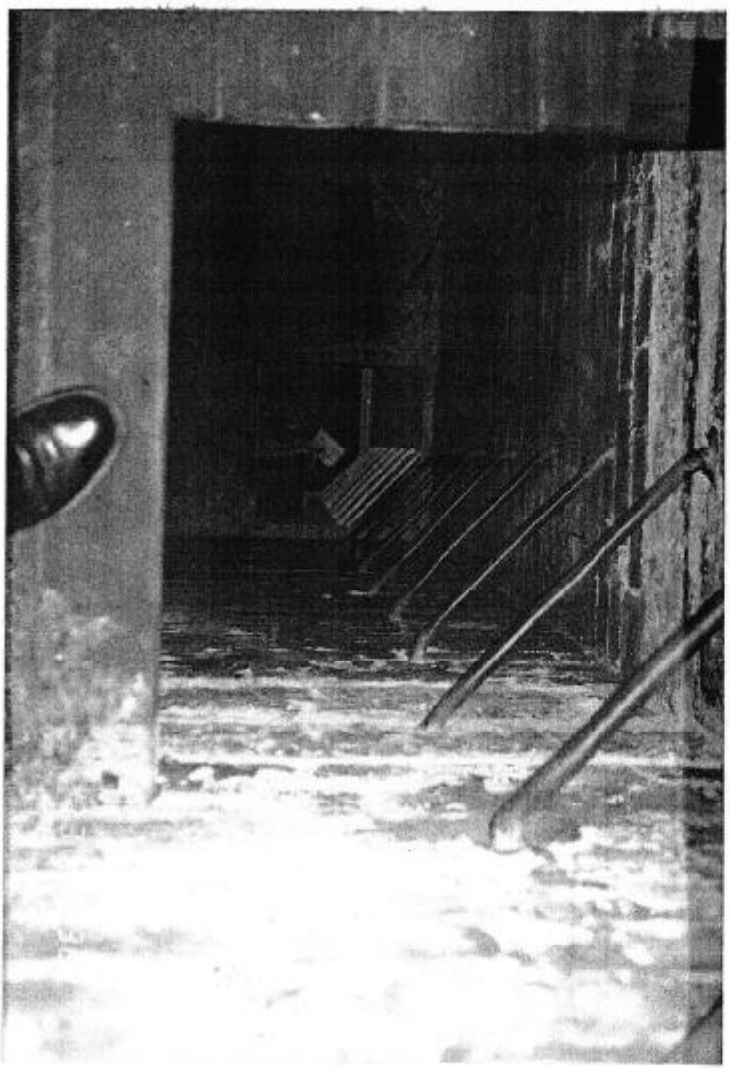
Repairs carried out to the western elevation 1976-1987 by the workshop modernisation department of the railways included this novel corner treatment. Steel brackets supported the verandah as the posts were continually being knocked by trucks driving close to the building.
Fig. 21

View from the 1944 addition looking toward the locomotive workshops. Note the built-up sill and rail used as the pay office.
The two windows either side of the central window were added as part of the 1944 additions.
Fig. 18

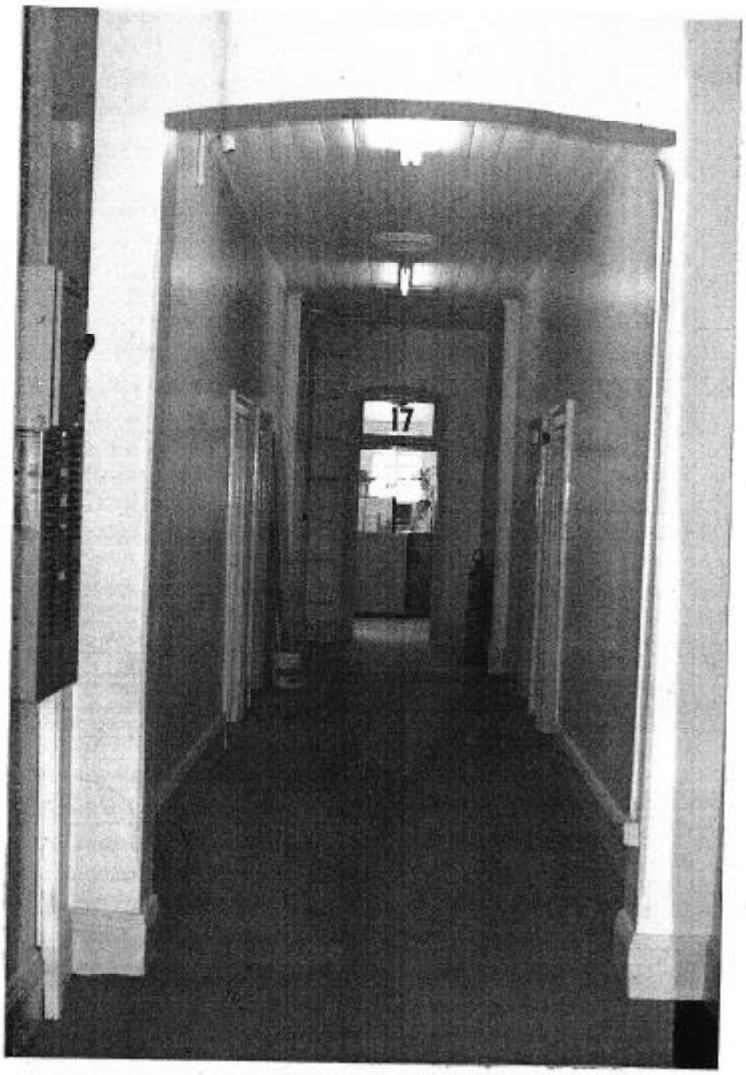
The original cast iron lacework and posts have been repaired and in some instances replaced with steel. PVC pipes with awkward offset bends, air conditioning units and security grills are obtrusive and ought to be removed. The bull nosed verandah has been replaced.
Fig. 19



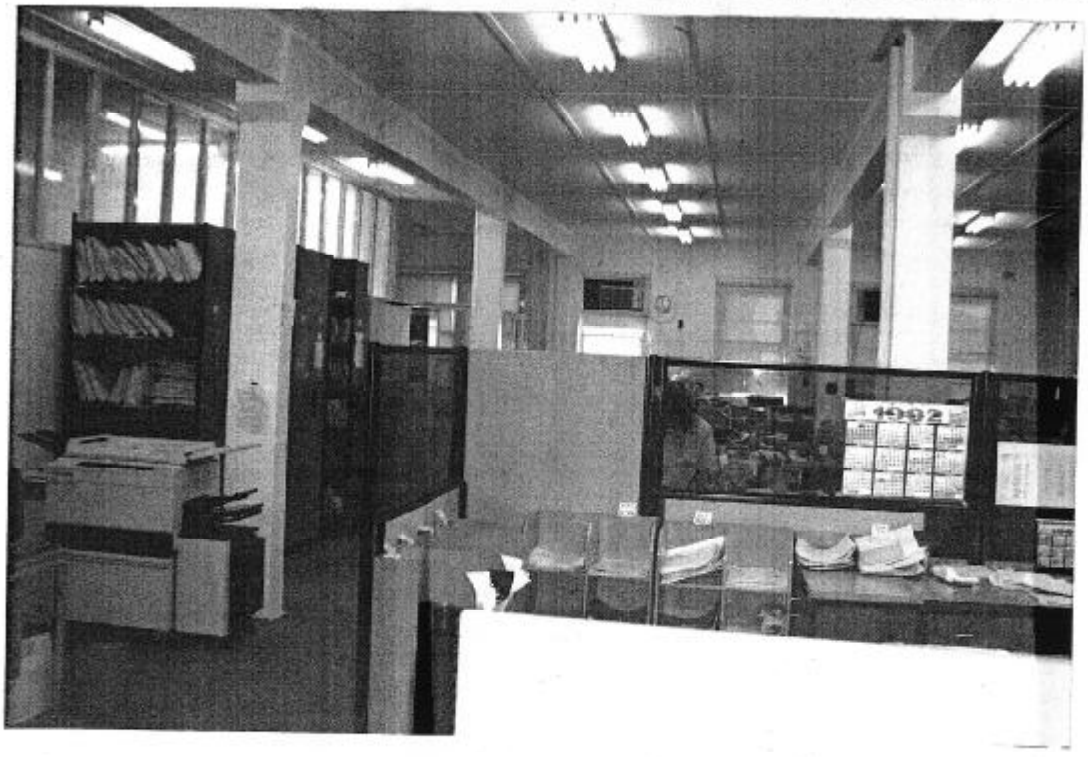
View from the belltower over the original 1887 building. The double hipped roof was extended and the tee section was added in 1944.
Fig. 22



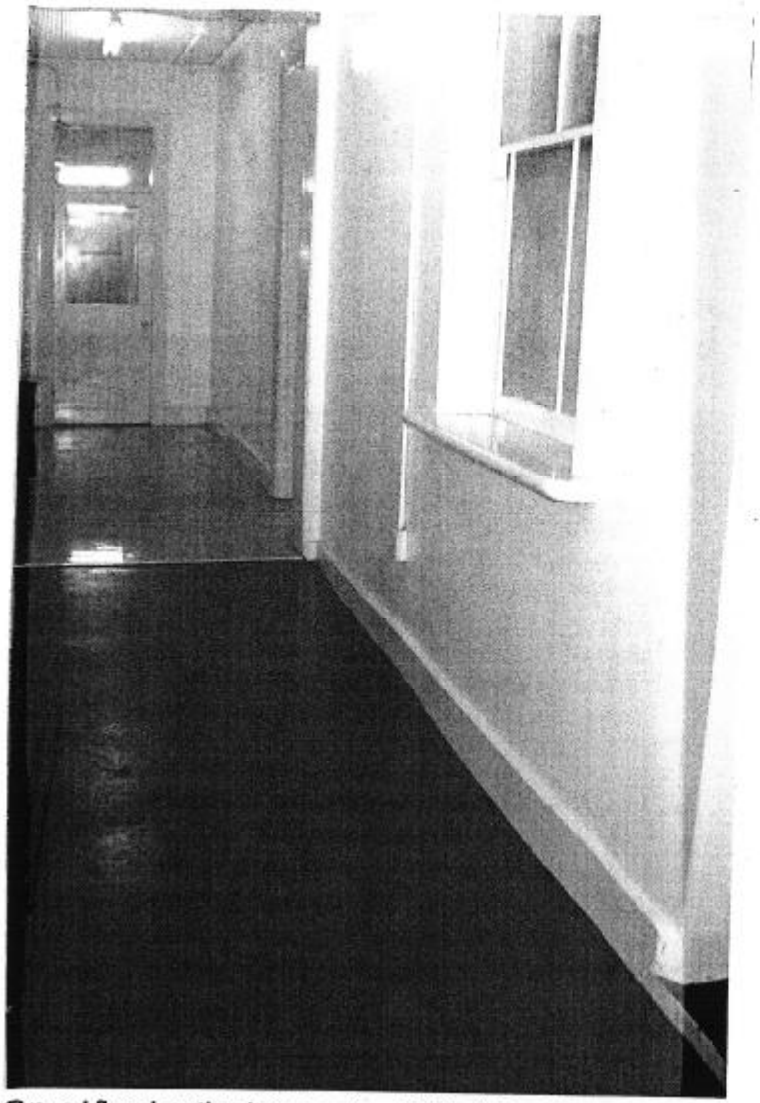
Looking down from the bell tower to the first floor. The bell was stored here from the second world war until 1976.
Fig. 23



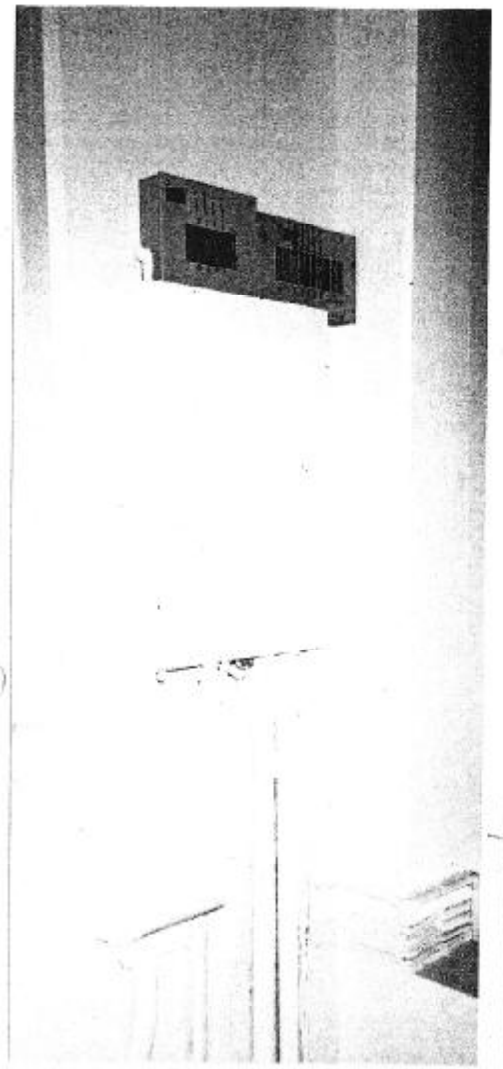
Looking toward the western end of the building. Note the ladder to the clocktower. The device for ringing the bell ran next to the light conduit, through to the floor below.
Fig. 24



Open plan office space added as part of the 1944 additions.
Fig. 25

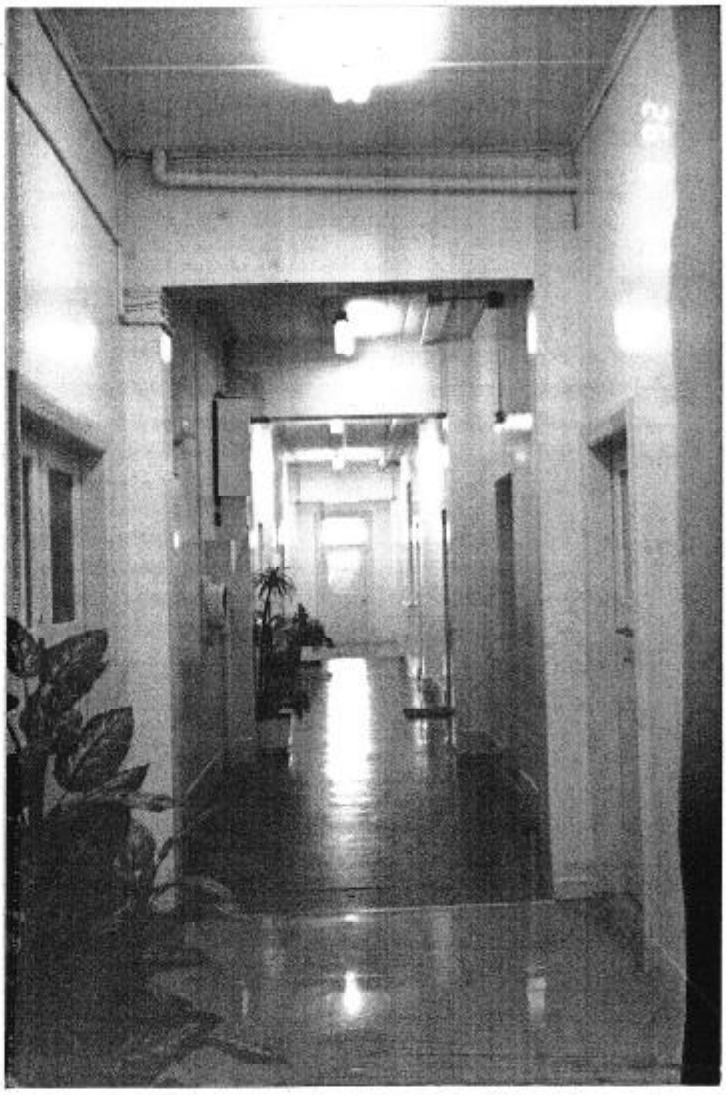


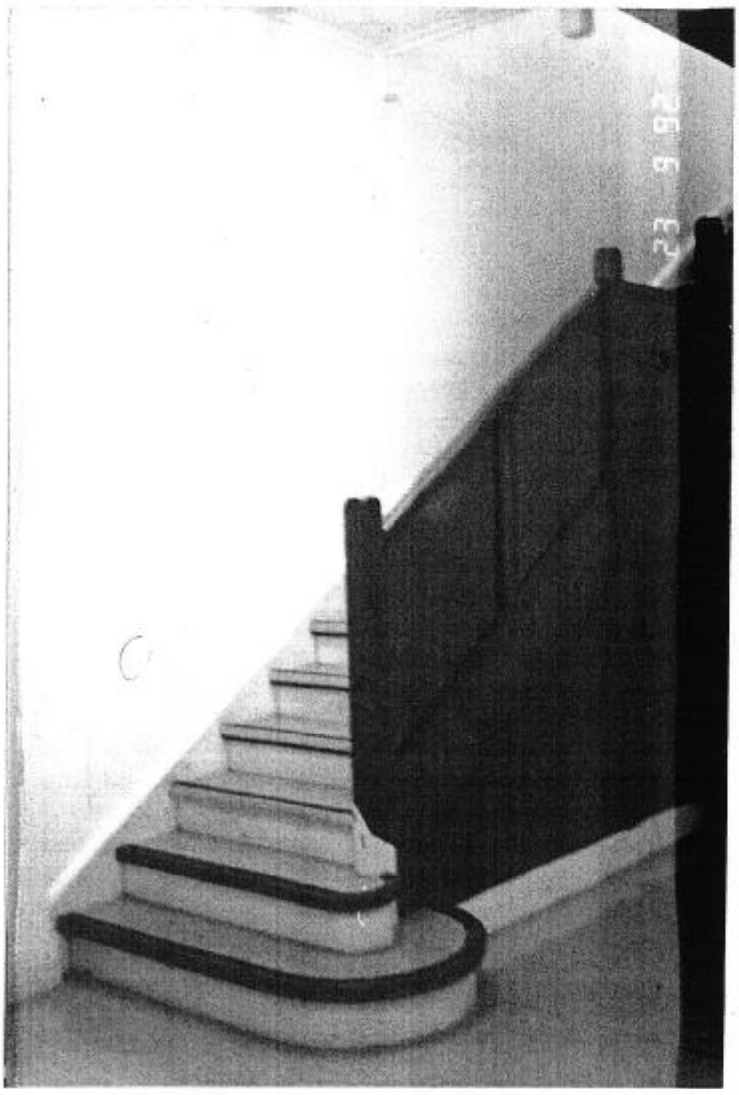
Ground floor junction between the 1887 building (foreground) and the 1922 addition. Note that the concrete floor slopes up to the 1922 addition. The floor finish changes from painted concrete to vinyl. Note also the corrugated metal ceiling in the 1922 addition.
Internal windows were used to provide borrowed light through to the central corridor in the 1887 building. The skirting is not original, probably replaced as part of the 1944 extensions. Electrical conduits have been added through the successive alterations. These are unsightly and ought to be removed.
Fig. 26



Much of the wiring from electrification of the workshops in the early 1900's has remained and is obtrusive. Door thresholds and timber doors are still being used. Some of the doors are in poor repair. Note the change in floor and ceiling finishes between the 1944 addition (foreground) and the original 1887 board ceiling.
Fig. 28

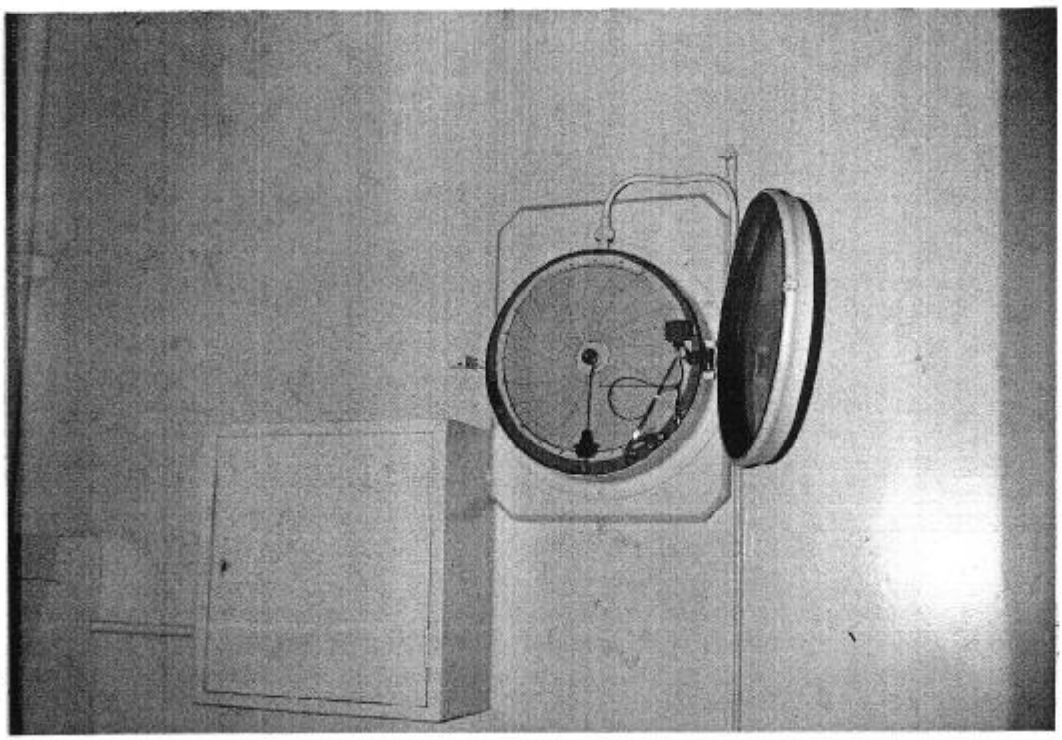
Fig. 27



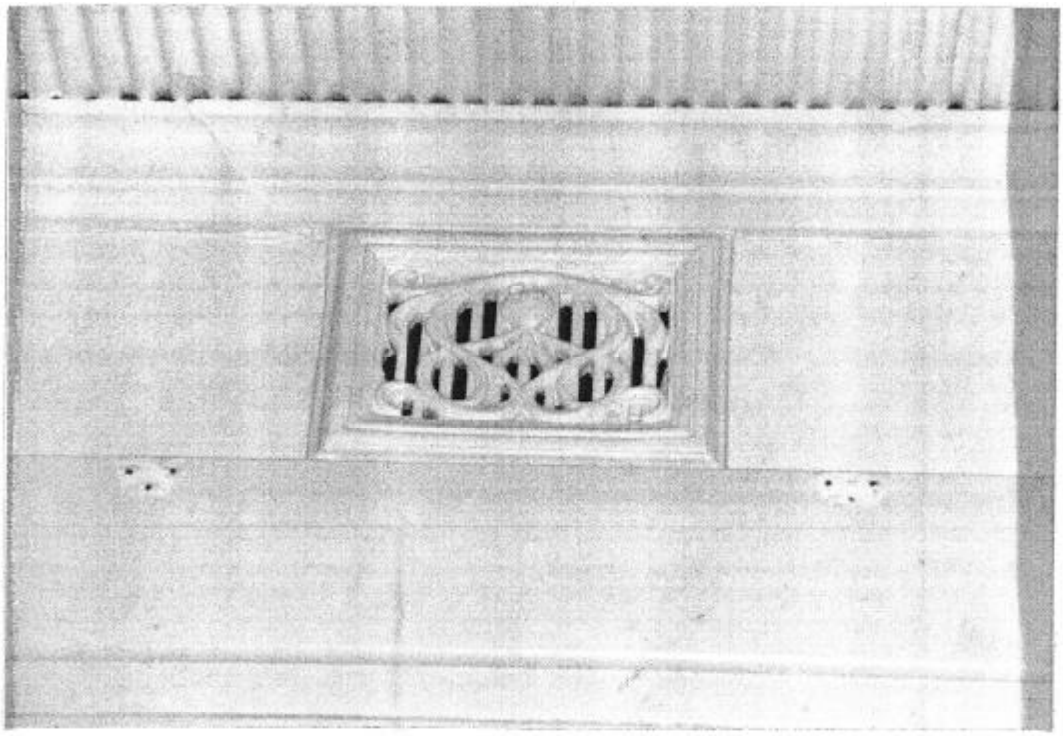


This staircase was part of the 1944 additions. The original stair was located in the office to the left of the photo and was removed when the building was extended in 1944.
Fig. 29

Central hallway. The corrugated metal ceiling remains from the 1922 addition.
Fig. 30

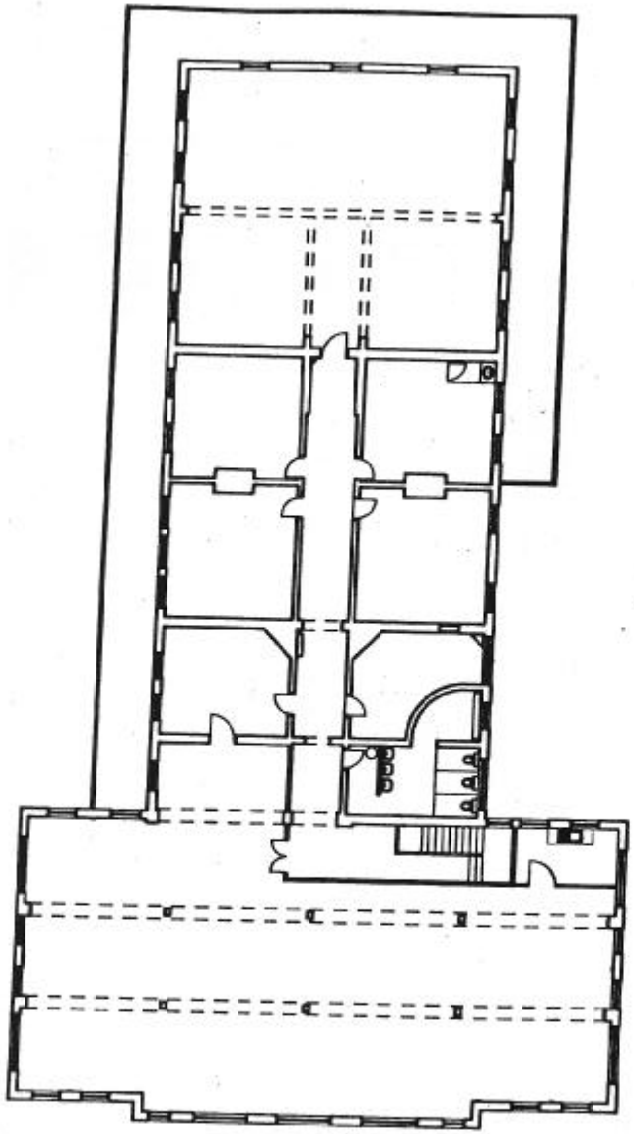


This machine, located in the ground floor hallway was used to graph out the air pressure being used in the workshops. The higher the air pressure the less the machines were being used. The shift time on/off whistle powered by air pressure was also operated from this point.
Fig. 31

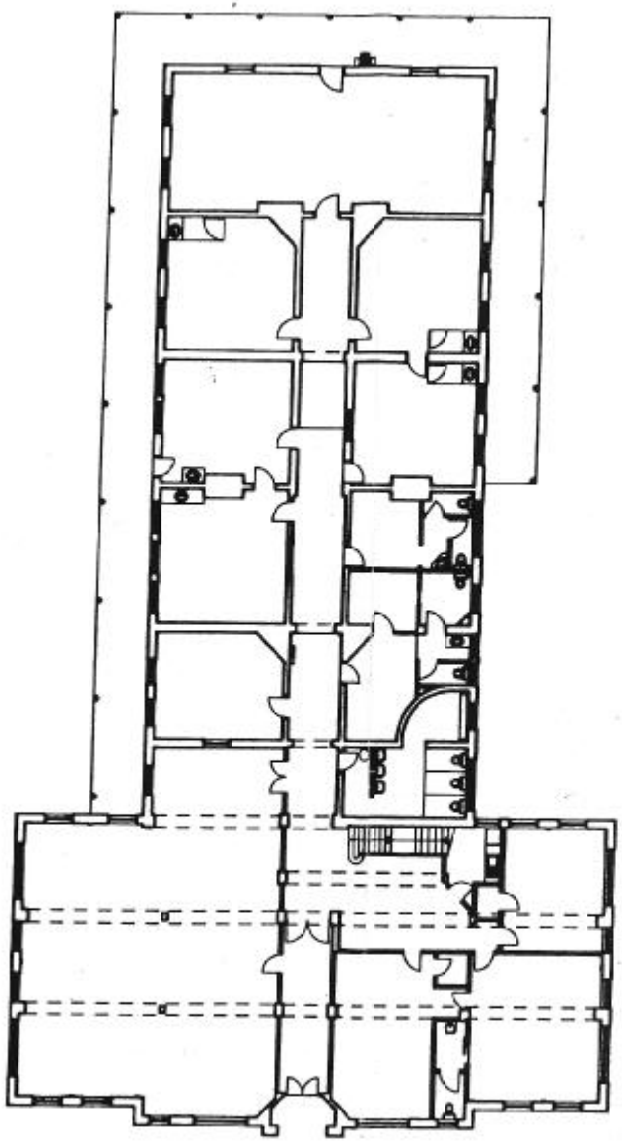


An air vent incorporated in the 1922 additions.
Fig. 32

1.8 ARCHITECTURAL DRAWINGS OF THE EXISTING WORKS MANAGERS OFFICE



EXISTING FIRST FLOOR PLAN



EXISTING GROUND FLOOR PLAN

0 5

fig 33

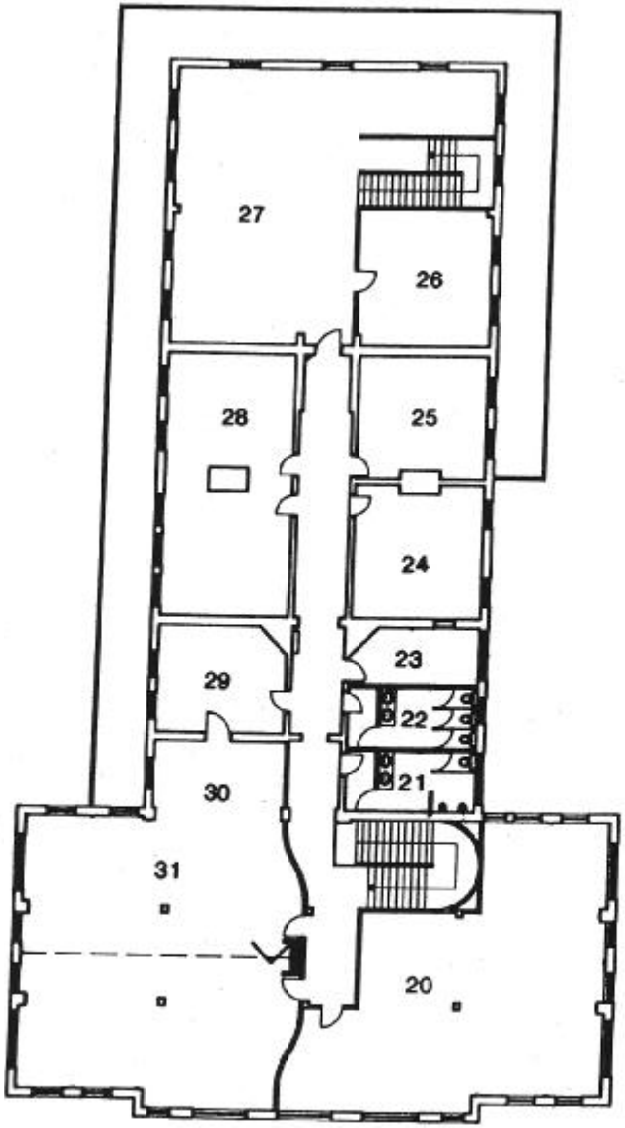
EAST ELEVATION

WEST ELEVATION

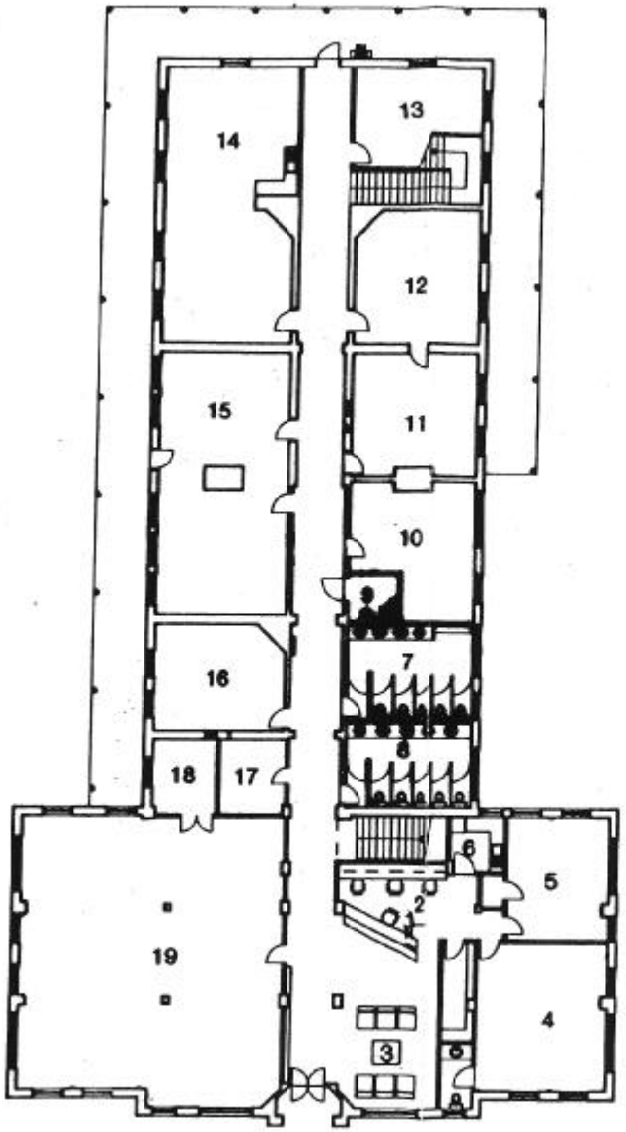
NORTH ELEVATION

SOUTH ELEVATION

fig34



PROPOSED FIRST FLOOR PLAN



PROPOSED GROUND FLOOR PLAN

LEGEND

GROUND FLOOR

1. Reception
2. Office
3. Foyer
4. Head of School
5. Business Manager
6. Kitchen
7. Male Student
8. Female Student
9. Disabled
10. ATP Office
11. Student Common
12. Library and Student Common
13. Tutorial and Video Conference
14. Staff Common
15. Tutorial
16. Board Room
17. Accountant
18. Store
19. Function / Display / Lecture Room

FIRST FLOOR

30. Workstations
31. Male Staff
32. Female Staff
33. Photocopy
24-27 Masters of Doctoral Studies
29. Professor
30. Secretary
31. Lecture

AUSTRALIAN GRADUATE SCHOOL OF ENGINEERING INNOVATION

fig 35

Part 2: RECOMMENDATIONS AND POTENTIAL USAGE FOR THE BUILDING

2.1 ESSENTIAL WORKS

2.1.1 General Specifications - Facilities to be Provided

It is proposed that the building be used for the new Australian Graduate School of Engineering Innovation.

To meet with all requirements it is proposed that the following works take place:

- Construction of new lobby stair and balustrade with glass and stainless steel top rail
- Construction of new fire stair with solid balustrade & stainless steel handrails
- 1 Hour incipient spread fire rating to underside of timber floor
- New acoustic panel suspended ceiling levels 1 and 2
- New fitout to six bathrooms (tiles / fittings / vanities) levels 1 and 2
- New fitout of kitchenettes (rooms 6 and 14)
- Fitout of reception joinery and storage rooms
- Pinboards and display joinery to lobby and corridors
- Construction of all new partition walls (masonry and plasterboard as appropriate)
- Installation of double glazed Pella windows throughout with built in venetians to match the existing windows
- Replacement of all internal doors and door frames
- Level ground floor lobby / reception / corridor to take granite or travertine paving
- Level floors as required for carpet to all offices, teaching spaces and stairs
- New set plasterboard vaulted ceilings to corridors
- New pinboards to all teaching spaces
- White boards and projection screens to all teaching spaces
- Operable wall to the lecture theatre on the 1st floor
- Workstations (as required from the user brief)
- Make good throughout (skirtings, timber work, patch walls, ceilings etc.)
- New armour plate frameless glass glazed entry doors on floor springs
- New entry porch paving (continuation of granite or travertine paving)
- Mobile tiered seating platforms to lecture theatres
- Replacement of ground floor corner verandah posts
- Painting 100% interior and 100% exterior
- Fit noise reduction seals to all external doors
- Replace downpipes externally as required to eliminate unnecessary bends etc.
- External works (paving, courtyard walls, landscaping, fencing, carparking)
- Loose furniture tables, chairs and desks (as setout in the brief) lobby sofas and office furniture

2.1.2 Requirements of Building Code of Australia (BCA) for the Australian Graduate School Of Engineering Innovation

A3.2	Classification	Class 9B (schools)
C1.1	Construction Type	Type B (2 storey)

- **Projected Occupancy**

Staff: 17
Students: 280
(based on two full lecture theatres, one full tutorial room and half occupancy in study caroles)

Total 297

- **Sanitary Facilities**

F2.3			Pan	Urinal	H/Basin
	Staff	M	1	1	1
		F	2		2
	Students	M	4	5	5
		F	6		4

Assuming distribution 40% female and 60% male.

F2.4

Disabled 1 Unisex facility

- **Compartmentation**

Total Area $1177.5m^2$

C2.2 Max Size of fire compartment: $5500m^2$

- **Egress**

D1.2 (iv) Number of exits required: Not less than 2

D1.3 (iii) Non fire isolated exits acceptable

D1.4 c Distance to exits: 20m to point of choice between 2 exits being no more than 40m from exit.

D1.6 c Dimension of exit except for doorway: 2.75m (assuming max. of 180 persons).

D1.6 f Doorways: total not less than 2.5m wide

D3.2 Disabled access to be provided to every room if no alternative similar facilities to those provided in that room are accessible elsewhere.

- **Fire Fighting Equipment**

E1.3 No fire hydrant required if building is no more than 60m from external hydrant.

E1.4 Fire hose reels required, and
- b be not more than 4m from required exit
- c service only the floor on which located

E2.1 Natural smoke venting permitted

C4.1 Fire resisting construction

h Floor separating storeys must:

(i) be constructed such that floor / ceiling system has a resistance to the incipient spread of fire to the space above of not less than 60 min.

(ii) have a fire protective coating to the underside of floor including beams of 30/30/30.

2.1.3 Identification of Essential Works

In general terms the masonry fabric of the building appears to be in reasonably sound condition and shows little decay or damage.

Essential work to be carried out includes:

- Fire rating of ceilings in accordance with the BCA
- Provision of two new egress stairs in accordance with the BCA

2.2 ARCHITECTURAL DRAWINGS SHOWING PROPOSED CHANGES TO THE WORKS MANAGERS OFFICE

APPENDICES

1. Articles
2. ICOMOS 'Burra' Charter
3. Select Bibliography

NEW SOUTH WALES GOVERNMENT RAILWAYS.

28

EVELEIGH LOCOMOTIVE WORKSHOPS.

(1916)

In 1887 the work of repairing Locomotives and Tenders was commenced at Eveleigh Workshops; previous to that date the requirements of the New South Wales Railways in this respect had been satisfied on a site which now forms part of Sydney Yard. In the comparatively short period which has elapsed since work at Eveleigh was started rapid advances have been made, and from being a factory in which comparatively light repairing and overhauling was undertaken, it has now expanded and is equipped in such a way that the repairing and building of high class modern locomotives is carried out upon sound business lines.

Step by step dependence upon outside sources has been reduced; no opportunity to introduce labor saving and more economical methods of production has been lost, and it may be stated that Eveleigh Works while still progressing, stand today first in the Commonwealth and compare favorably with the best Locomotive Workshops in other parts of the World.

At the outbreak of War in August, 1914, the Railway Commissioners, who had been importing materials required in connection with the upkeep of the rolling stock, were faced with the possibility of supplies being greatly curtailed, if not entirely cut off. Ways and means had to be found to make good this shortage of materials and the difficulty was overcome by the use of second hand material in lieu of new and the manufacture in the shops of otherwise unobtainable articles. One item worthy of special mention is Superheater Elements, the whole of which had been previously imported. These, after a few preliminary experiments were satisfactorily manufactured and put into service at considerably lower cost than the imported. In the manufacture of these Elements advantage was taken of the Oxy-acetylene Welding process and by this system of welding much time and money has been

State rail Archives.

saved during the last few years. Its use has frequently enabled the staff to repair machine parts, which had previously to be renewed. It has been used with success for building up defective castings, undersize wheel seats, corroded tubeplates, foundation bars, worn expansion brackets and other details and broken frames. Regarding its application to broken frames, many of the repairs effected by it would be very difficult otherwise and in the case of bar frames a break which previously necessitated complete stripping of a locomotive is now repaired with the boiler in position, and only those parts adjacent to the fracture, removed. It will be obvious that the cost under newer conditions is only a small fraction of what it was previously.

The advantages of the electric welding system have not been lost sight of, this process has been in use at Eveleigh several years and work for which it is specially adapted is passed its way for treatment. Advantage has been taken in this process of the fact that many "building up" jobs can be satisfactorily accomplished with ordinary mild steel wire, thereby saving the cost of special flux-coated electrodes which are reserved for special work.

Both Oxy-acetylene and electric welding sets are distributed about the Works, their location being such as to keep transportation costs at a minimum.

The Blacksmiths Shop is well equipped and quite up to the usual Eveleigh standard; successful efforts have been made in this shop to forge to size many details which were previously machined, excellent samples of work of this nature being produced in the Oliver Section on the Ajax Forging Machines. These machines are recognised as being amongst the best of their class and in these Works the utmost is got out of them, furnaces fired with crude oil being installed to heat the bars. The installation of the Continuous Heading Ajax Machine rendered the purchase of rivets unnecessary and enabled Eveleigh to supplement supplies of rivets,

dogspikes

dogspikes and fishbolts to other branches of the Railway and Tramways.

All the heavy forgings required for the production of locomotives such as axles, foundation bars, coupling rods, connecting rods etc., are produced in Eveleigh Blacksmiths Shop, the largest steam hammer employed being of 70 cwts capacity. For purposes of economy each steam hammer furnace carries a locomotive boiler through which the products of combustion pass, the steam generated in which assists the main battery of boilers in driving steam hammers and operating other machinery. It has been found advantageous to make several details such as door knocker springs for wagons and boss liners for locomotives, between formed tools under an Hydraulic Press, - very satisfactory jobs resulting. That section of the Blacksmiths Shop devoted to the manufacture of springs contains excellent spring coiling and testing machines in addition to the equipment usual in such shops, one coiling machine being capable of dealing with spiral springs of 2" x 2" steel bar and having on it an attachment to enable volute springs of variable pitch to be coiled. During the War when spring steel was unobtainable, springs were made in this shop from condemned tyres and rails. To indicate the progress of efficiency in this particular shop, it might be mentioned that in the year 1916 the output of the shop was 47,530 springs, while for the eleven months of the current calendar year the output has been 70,702 springs, and this output was produced by 18 less employees than were engaged in 1916.

The drilling augers and spirals taken on Active Service by the A.I.F. Mining Corps were forged here promptly on short notice, tools for the purpose having to be devised and made. These forgings had a finish superior to the machine made pattern supplied for Workshop guidance.

An important section of the work at Eveleigh, previously performed in the Blacksmiths Shop but since transferred to the Tool Store, is the hardening and tempering of milling cutters and tools used in the Machine Shop, and in connection with this work the old system of guessing temperatures no longer prevails. Gas heated

furnaces

furnaces fitted with pyrometers are used and no doubt is entertained regarding the result.

In the near future it is proposed to instal a 1,500 ton Steam Forging Hydraulic/Press with the necessary boilers and furnaces, this will enable Eveleigh Blacksmiths Shop to undertake heavier forging work than any other Shop in the Commonwealth.

The Pattern and Carpenters Shop, a two storied building added to the Works during recent years on account of Machine Shop extensions, contains excellent machinery for dealing with timber and the manufacture of patterns, the universal woodworker and bench tools shewing clearly that reduction of labor and time taken to produce patterns and carpentry were carefully considered.

The Foundry built during recent years to cope with increasing demands for castings and to allow of extensions for dealing with boiler repair work has since its completion made rapid strides, work previously carried out by contractors for the Locomotive and other branches of the N.S.W. Government Railways is now done more promptly and at less cost at Eveleigh. Machine moulding, not many years ago a novelty, now copes with a large percentage of the work, several of the machines employed being manufactured completely here. The range covered by these moulding machines is an extensive one, the number of articles required being in many cases a factor which determines whether the necessary equipment shall be made and the job handled on the machine. An unusual method of moulding single fire-bars on an Eveleigh manufactured machine has given exceptionally good results. The bars are cast top down on a cast iron chill plate, the mould which stands on this plate being rammed by pneumatic rammers. The pattern plate on the moulding machines is vibrated pneumatically and hand drawn. At present this principle is being extended, the intention being to deal with double firebars on a similar machine and to deal with piston rings on a machine similar in principle but of improved design. By the elimination of skimming on much of the work and the use of trollies, oneeman can now with ease handle more than twice the weight of metal previously handled with discomfort by two men and a boy.

Several

Several jobs in iron have been cast in permanent moulds and put straight from moulds into service, in such cases the castings were previously machined all over and it is hardly necessary to point to the fact that longer life results due to the chilling effects of the mould.

A clay pudding plant has been installed for the purpose of reclaiming moulding sand; so far its use has been confined to the machine section. Experience will enable the extension of the system throughout the Iron Foundry to be brought about successfully.

Supplementary spouts have been provided together with troughs from the Cupola Receivers to allow of metal being drawn from 2 points at one time, the object being to reduce time lost waiting for metal. To instil confidence in the minds of those who have to open up the receivers after the days pour, the front spouts have been hinged rendering it unnecessary for any employee to be near when this operation is carried out.

In the Iron Foundry, wasters in machine moulding are not common, and it is unusual for any wasters to be produced in the jobbing work.

What has been said regarding machine moulding in the Iron Foundry applies with equal force to the Brass, in which a year or two back every pound of metal was carried to the moulds, and where now is erected an over-head-runway, for that purpose. Regarding appliances for melting, the Hawley down draft furnace has swept aside the crucible, the former enabling Eveleigh to melt down one ton in less than an hour, a thing unheard of not many years ago. It is fitting to mention here that aluminium-copper castings for a 6-cylinder internal combustion engine were produced satisfactorily in the Brass Foundry recently and that a job of this nature not usual to the Shop being successfully dealt with is a good omen and further that copper and copper-lead 50-50 castings have been made, in the latter case a contrivance being rigged up to prevent segregation.

Much

Much of the non-ferrous alloy scrap produced in the Department was until recent years sold. The practice now is to classify and retain this valuable material, selling only that for which no use can be found. Under this policy a magnetic separator and a whitemetal separator were manufactured in the works, both of which machines came up to expectations in service.

In the Steel Foundry alloy steels of different natures are made in addition to ordinary carbon. The plant here is an oil fired Stock Steel Converter the melting and converting being carried out in the same vessel. Success has attended the use of the plant since its installation; it has, however, been realized that a Steel Foundry is not complete without an Electric Furnace and an Electric Furnace is therefore to be put in. Much work previously forged has been taken in hand, Machine moulding, Multiple Moulding and permanent moulds being used as occasion demanded and the production of high manganese steel crossings has been successfully undertaken. The guessing of temperatures in annealing has been cut out by the installation of a recording pyrometer on the annealing furnace.

The floor area taken up by the Machine Shop has approximately doubled during the last 8 years. From time to time obsolete machines have been replaced by modern ones and additional machinery has been installed to cope with increased work brought about by increased volume of traffic, work from other Branches and reductions in finished supplies from other sources. Until about 6 years ago the machinery in this shop was operated by steamdriven engines, excepting isolated independently motor driven ones; now electric motors acting upon sections supply the necessary power to all but the larger machines which are self contained. The shop from dealing with locomotive repairs only, now does manufacturing work for the Locomotive and other Branches, and undertakes the manufacture of many tools and appliances previously bought, in addition.

The replacement of axles and tyres is one important section of its activities, the allowance for fit and shrinkage, being definitely determined by standard gauge, dependence upon calipers for such work being a thing of the past. The use of jigs and gauges has replaced the one time methods of templates and marking off, the accuracy necessary for the former bringing about the need for the use of high grade measuring instruments which were obtained. The instruments form part of the Tool Room Equipment; this section of the Machine Shop contains modern Relieving Lathes.

Gear Hobbing and Planing Machines, a Bevel Gear Planer, High class precision grinding and other machines; accurate tools, such as dies, taps, milling cutters, hobs etc, are machined here together with cut gearing for manufacturing and replacements. It had been the practice to let to contractors the work of repairing and adjusting steam and air pressure gauges; the bulk of this work is now undertaken in the Tool Room. Pinions and spur wheels for the Tramway Department are now manufactured at much less cost than they were undertaken formerly elsewhere, the spur wheels being grouped and gashed on a 16 ft. stroke Lancashire Drive Planing Machine and finished on a gear planer.

Special machinery has been acquired for accurately repairing pneumatic hammers, and it is interesting to note that nearly 1,000 H.P. is absorbed compressing the air used by these, together with Drilling, Moulding and other machines in various parts of the Works. The capacity of the Machine Shop for work outside of that necessary for Locomotives is extensive, many jobs of all classes are undertaken and successfully dealt with for Existing Lines, Electrical, Signalling, Water Supply and other Branches, and it has been found cheaper in many instances to undertake the repair of machinery damaged in transit than to pay the claim made on account of same.

Regarding

Regarding the tools used on lathes, drilling and other machines, the operators of same are not allowed to grind their own, a special staff is set aside for such work, clearance angles being standardised and not left to the whims of the particular man using the tool, and further instead of having to be one of a congregation round a grindstone, a damaged or blunt tool is passed in and a sound one received in lieu in a few moments, more operating hours being got out of the machine and more reliable information being available regarding the behaviour of the various brands of tool steel in use. Accurate tests are made of modern high speed steels, the results of these are tabulated and used when deciding whether or not a particular brand of steel shall be adopted and no effort is spared to secure that type of steel from which the greatest output results, having regard to its price. Sufficient has been said to indicate the advance made in this important matter, in recent years.

At the present time the Machine Shop is being sectionalised in such a way that transportation during manufacture is reduced and complete concentration on the requirements of a particular section may be given by those employed in that section. Extremely satisfactory results have been obtained from this system, so far the extension of which will standardise the work and reduce labor by admitting of that form of sectional analysis without which the best results are unobtainable. Further, splendid opportunities occur through it to reduce the total equipment required for a particular job, such equipment being under this system always in use.

In the Boiler Shop, rapid strides have been made during the last 5 years, one important point being in the elimination of the bulk of the angle iron work and the substitution of flanged plates, another being the drilling of assembled plates thereby bringing initial stresses in riveted joints down to a minimum and reducing what was at one time necessary labor in drifting holes previous

to rivetting to a negligable amount. The fact that the N.S.W. waters are not uniform and that traces of Hydrochloric Acid exist in some, makes necessary high class boiler work in Eveleigh, to which may be added the fact that locomotives are by no means nurse on these Railways, the conditions of loading and speed being exac ing. On account of the water all mild steel stays are protected below the water line by being cased with a munts metal ferrule the space between which and the stay is filled with liquid cement. The fitting and heading of copper firebox stays receives careful attention, the most up-to-date tools being employed on this work. The increased size of locomotives now use renders flanging and bending operation in the Boiler Shop much more difficult than formerly. On the older locomotives the flanging of the throat plate was a far simpler job than on modern ones. After flanging all plates are carefully annealed and flaying of heavy plates for the Commonwealth Railways was undertaken in this Boiler Shop.

Within recent years steel side and roof plates previously separate have been made in one piece, thereby eliminating two joints and making a better stronger job, the setting of such plates is done on a Hydraulic Bending Machine. No holes in Boiler plates are now punched, previously some were, and all but a few rivets in awkward positions are closed by up-to-date Hydraulic Machinery. Many of the rivet furnaces in use have during recent years been arranged to use tar for fuel. Steps have been taken to prepare for and flange many copper plates which were previously imported in that condition, economy being the object aimed at. These copper plates are only passed into the furnace once for flanging the necessary thinning of the edge being done on a milling machine. It has been proved that this method is more economical and advantageous than the more common one of thinning by the repeated heating.

The Oxy-acetylene and electric welding processes have been usefully applied in the Boiler Shop, the former for cutting, the

latter

latter for building up. An ingenious arrangement is in use for cutting circular holes. Neat clean work is done by its aid.

Although the strength of plates for boiler construction is guaranteed by the manufacturers no plate is put into use without being tested in the Departmental Test Room and any plate not up to British standard specification is rejected, a complete history of all plates in service being kept. In addition to boiler work tanks and tenders are constructed in the Shop, the old costly method of using countersunk headed rivets for appearance is now largely superseded by use of the more reasonable snap heads.

The Railway Commissioners are building a much larger Boiler Shop at Enfield to cope with present and future requirements room for further extensions of the shop at Inveleigh not being available.

The all round extensions at Inveleigh, the installation of high class machinery and the manufacture of shop equipment now undertaken has changed the Millwrighting section from a small gang of jobbing fitters into a number of highly specialised squads, each having to concern itself with the needs of the position of the whole of the Works. The fitting and erecting of moulding machines and coremaking machines, the repair of broken machinery, the installation of plant and equipment, and the building of all engines and machines not purely intended for locomotive requirements is undertaken by the Millwrights. At present in addition to much other work a 6 cylinder reversible rail motor is being manufactured for use on these Railways a departure from the usual manufacturing work carried on here well worthy of note.

The Millwrighting section has successfully taken in hand all work passed to it, having already in addition to the machines mentioned above dealt with Rumblers, a sprue cutter, loam mill, fire-bar machines, revolving moulds, loam reclaiming plant, magnetic separator, whitemetal separator, floor grinders, cone

facing

facing machines, portfacing machines, hydraulic pipe bending machines and boring machine. The variety of work done in this section will be better appreciated when it is stated that a steam hammer, pneumatic oliver and a pie making machine for the Departmental Refreshment Rooms are now being constructed.

Rawhide and paper pinions have been replaced in many instances by fibre ones manufactured in the Works, the pinions so made have given good results in service.

Valuable service was rendered by the Millwrights in the equipment of that section of the Boiler Repair Shop devoted to the cleaning, brazing, and cutting to length of boiler flue tubes. The demands for this, in common with other work, have increased during the last year or two. To reduce the time taken to braze the ends on the tubes in question each coppersmith operates upon two gas-fired furnaces, having the assistance of a laborer, the laborer doing that portion of the work requiring no skill, such as placing the tube in position for brazing and removing it after brazing; the coppersmith only dealing with the actual brazing operation. The gas furnaces and machines for dealing with tube ends were manufactured and installed by the millwrights. Considerable saving has been effected by the introduction of the method outlined above. A small item, yet one worthy of mention, is the introduction of a frazing wheel to take the place of carborundum stone for trimming the tubes after brazing operation. Recently the practice of leaving the tube outstanding at the smokebox end has been adopted, and under this arrangement tubes do not require renewal when the firebox end of them has been burnt, it being only necessary to drive the tube back and re-expand it.

In the Erecting Shops the same progress has been made as in other parts of the Works - all unnecessary labor where evident being cut out. Great accuracy, where necessary, is given particular attention to, and the condition of a repaired locomotive leaving Eveleigh Workshops at the present time is such as to render that locomotive equal to new. The work in the Erecting

Origin of Eveleigh—*continued.*

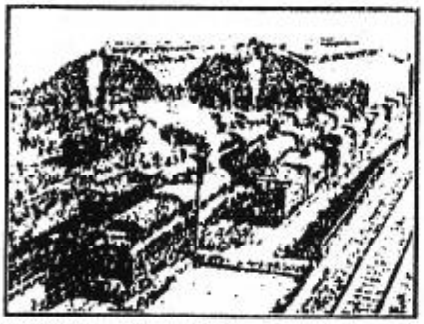
intermediate arches, every 6 feet 3 inches, are lighter. Between each arch are two windows.

The height from rail level to the inside of the arch at the centre is 37 feet from rail, with another 9 feet to reach the top of the lantern roof. When first built ventilation was on what is known as the ridge and furrow principle, really a number of small roofs on the main roof. Originally, the lantern roof was 250 feet long and 21 feet 6 inches wide. In 1905 this was reconstructed, the lantern being lengthened and louvres replacing the old

Eveleigh Car and Wagon Shops To-day.

ridge and furrow roofs, which may be seen at the level of the eaves of the signal-box, in the top illustration on page 105.

In the first roof there were skylights aggregating 48,000 square feet and another 2,400 square feet in the walls, making more than two acres of glass. Night illumination was provided by 1,500 fixed gas burners, while portable burners attached to flexible tubes were used for detail work. The



Sydney end of Eveleigh Running Sheds, with right-hand bay removed for Electrification of Illawara Line.

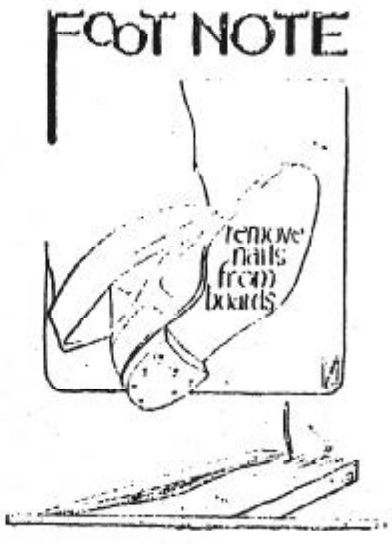
estimate for the roof was £38,000, and after much discussion tenders were called, resulting in one for £38,600 being accepted. The ironwork was imported from England. In all, the Running Sheds cost £68,455. Besides them were drivers' quarters, sand house, furnace and a coal stage 300 feet by 30 feet. Although there was much criticism of what was considered an extravagance, it was demonstated that the finished shed cost less than others of a more conventional design. Recently, the northern bay of the Running Sheds was removed for alterations at Illawarra Junction, when electrification was carried out.

The first Branch to be moved to Eveleigh was the Stores, which, in 1882, occupied new premises comprising one open and one closed store, each 200 feet by 50 feet, and a double-storey building. That year, the excavations for the Locomotive Workshops were put in hand, and foundations of the engine pits in the Running Sheds were completed. In 1883 the wagons repairs were moved to Eveleigh, and the large Running Shed was practically completed. Next year, the whole of the shop foundations were in the Running Shed completed and occupied, and the coal stage nearly finished. So urgently was space required at Redfern that portion of the Running Shed was first put into use as a temporary workshop. The year 1885 saw the first block of shops almost completed and the foundations of the Carriage and Wagon Shops put in.

Next year marked the completion of the locomotive shops, and the Car and Wagon and Paint Shops were finished and occupied about the end of 1887. About the same period the first section of the C.M.E.'s Office, comprising two storeys 100 feet by 50 feet was built.

Such were the Eveleigh shops at their inauguration. The title illustration on page 103 shows the Works Manager's Office and the Locomotive Workshops as they are to-day.

The reason a flag is flown at half mast is said to be because the flag of Death, signifying victory, is supposed to be flying above it.



lished in consequence; while the great Siberian line gives her a prepondering influence in Eastern Asia, not only politically, but also commercially.

It may, therefore, be safely said that the influence exercised by the railways upon the economical, political, and military situations of the country cannot be estimated, more especially if the great extent (Russia in Europe having an area of 2,081,370 square miles), the diversity of climate, soil, &c., and the generally bad condition of all other communications are taken into consideration.

The Locomotive Shops at Eveleigh.

IT is hardly necessary to mention to our railway readers the position of the railway workshops at Eveleigh, but, to the stranger who may chance to read our pages, they will arrest his attention, should he be travelling by rail from Sydney, soon after he passes Eveleigh Station and on the left hand side, he will see the extensive range of shops which are devoted to what is termed "The Locomotive Side," the carriage and waggon shops being almost opposite, but on the right hand side of the line. The extent of the operations carried on there may be judged by the fact that, altogether, they give employment to 10 per cent. of the men engaged on the railways, and it is thought that a description of the establishments would be of interest, not only to the men employed, but generally to the Railway Service, more particularly as, recently, extensive alterations have been made to them, especially in regard to the new erecting shops, and the equipment of the shops with the most modern machinery.

In giving a brief description of the premises and machinery on the locomotive side it may be stated that the locomotive shops consist of 15 bays, the first four of which are 300 feet long and 60 feet wide. The remaining bays being only 50 feet wide. They give employment to over 900 men. The offices for the Works Manager and timekeeping staff are separate from the main buildings.

SHOPS NOS. 1 AND 2 are devoted entirely to forge and smiths' work and contain several steam hammers, ranging from five cwt. to two tons, and 21 smiths' forges. There are three steam hammer furnaces over which old locomotive boilers are mounted for generating the steam for the hammers. They are also equipped with tyre furnaces and necessary appliances for re-tyring all wheels. Two mechanical strikers, worked by compressed air, have lately been introduced. Nut and bolt machines, with hot and cold iron saws, power-driven punching and shearing machines, slotting and drilling machines, hydraulic pressers and "bulldozer," with pneumatic crane, for bending all classes of work, are installed.

SHOPS NOS. 3 AND 4 are wholly engaged on boiler work. Most of the machines in these shops are worked by hydraulic power, consisting of a stationary, gap, hydraulic riveter, with lifting gear overhead, portable hydraulic riveters, with cranes attached, a double-ended hydraulic punching and shearing machine, and a large hydraulic press for flanging plates. There are also tapping, plate-edged planing machines, bending rolls capable of bending plates up to 12 feet wide, punching and shearing machines, power-driven tube-plate boring and drilling machines. The whole of this machinery is driven by a pair of wall engines, and it will be greatly augmented at an early date, as a number of modern machines, electrically driven, and large hydraulic riveters are under order so as to render the shops capable of dealing with the whole of the new boiler work required in future, as well as coping with the extensive repa... These shops also contain ordinary smiths' fires a... special forges for dealing with the flanging of plates ... angle-iron work, and are equipped with two over-h... rope driven, travelling cranes, which run the full len... of each shop, one of 10 tons capacity and the other ... tons. Compressed air is also used for working porta... tools, such as drills and pneumatic hammers.

NOS. 5, 6, 7 AND 8 SHOPS are used as erecting sh..., and contain pit and bench accommodation for di... mantling, repairing and erecting engines. They p... vide sufficient accommodation for 24 engines and tend... A ground traverser is used for taking the engines in ... out of these shops from the lines of rails outside th... main buildings. Twenty-five-ton overhead travellin... cranes run over three bays. These and sundry machi... are driven by a pair of 50 horse-power wall engines.

NOS. 9, 10 AND 11 SHOPS are used for machine wor... and equipped with heavy wheel, duplex and axle lathes, tyre-boring, drilling, and spindle-boring machines, mode... capstan lathes, special lapping machines, boring machi... and heavy milling tools, both vertical and horizontal, fo... dealing with foundation rings and all heavy work fo... new boilers, etc., three small horizontal and verti... milling machines for general work, slide-bar and to... grinding machines, brass finishers' lathes, piston ro... grinding machine, large gap lathes, and numerou... smaller lathes ranging from 16 to six inch centres ... general work, cylinder boring machines, and the usu... heavy planing, shaping, slotting, and radial drilling machines, nut tapping, general and special screwing machines used in first-class locomotive works. The... are two hydraulic presses, ranging from 200 to 750 to... in these shops. Air hoists have been introduced a... are used, operated over heavy lathes and other machines for lifting the work in and out. The whole of th... machinery in these shops is driven by a pair of 50 hors... power wall engines. A large tool store, containing sm... lathes and a milling machine for making and repairing special machine tools and cutters, is attached to the building. A number of modern machines have recent... been ordered for these workshops, such as special milli... machines and lathes; they will be installed at an early date.

NOS. 12 AND 13 SHOPS are in process of transformation and will be set apart for the machines and interlo... kin... work which it is intended to remove from Redfern ... Eveleigh.

NO. 14 SHOP is occupied by pattern-makers and carpenters. It is equipped with wood-turning lathes, sa... benches, planing machines, and all necessary appliance... for constructing patterns for the department. The patterns, after use in the foundry, are stowed in this building for future purposes.

NO. 15 SHOP is used as a branch of the General Sto... under the Comptroller of Stores. It is conveniently placed in the vicinity of the Workshops for supplying material for daily use in the shops and for forwardin... supplies of small details to country depôts.

The copper-smiths, tin-smiths, plumbers and gas-fitters occupy small shops between Nos. 4 and 5, and all work done in the way of repairing tubes, steam-pipes, &c., lamps and Westinghouse air-pipes for engines an... tenders, is prepared in them.

A large air-compressing plant—made by the Ingersoll-Sergeant Company and capable of compressing 950 cubic feet of free air per minute to 100 lbs. pressure—ha... recently been installed in an annex of the boiler sho...

from which air-mains are extended to the various shops for working lifts, pneumatic tools, etc. The air-mains are extended to the carriage and Waggon shops and will probably be led to the carriage cleaning sheds at Redfern and Eveleigh for the purpose of cleaning carriage cushions, carpets, etc.

There is also a large hydraulic plant with accumulator, weighted to pressure of 1,200 lbs. per square inch for working the different hydraulic tools about the shops.

NEW FOUNDRY. It was found necessary, owing to the increase in boiler work, to extend the boiler shop into the old foundry, and a new foundry—300 feet by 60 feet—was placed at the end of the main building. It is fitted with all modern appliances for iron and brass moulding, including three cupolas for melting iron, and twelve furnaces for melting brass. It has also one 16 ton overhead travelling crane, two hydraulic jib cranes, five and two tons respectively; one steam moulding machine, two core-ovens, sand-mixing machine and Chilian mill, with special "rumblers" and emery wheels for cleaning castings. On the outside of the foundry, hydraulic lifts are arranged for raising the scrap on to the platform for melting.

NEW ERECTING SHOP. In consequence of the natural increase of work, a new erecting shop has recently been completed and occupies a site parallel with the new foundry. It is a substantial brick building of two bays, each 400 feet long by 55 feet 6 inches wide, and fitted with the modern appliances required in connection with repairing and erecting locomotives. It is equipped with four overhead electric-power cranes, each having a lifting capacity of 35 tons—two in each bay; and the necessary machines, such as lathes, shaping, drilling, milling and grinding tools, are driven by electricity from line shafting running the whole length of the building, and worked by an electric motor. Each bay contains three lines of road, the centre one being a clear road, and those on each side of it are used for stabling engines undergoing repair. These roads have pits between the rails, running from end to end of the building, and thus affording every convenience for men to get about the work beneath the engines. Provision is made, by the height of the building and cranes from floor level, for the heaviest engine to be lifted by the overhead cranes, and passed from one road to another, over other engines: this avoids unnecessary shunting.

A steam laundry is in operation adjoining the new erecting shop, equipped with engines, boilers, revolving washing machines, hydro extractor, boiling tanks, etc., complete, and special ovens for drying the sponge-cloths and waste used for cleaning all over the railways.

In addition to the shops already mentioned, two large sheds have been erected at the end of the smiths' shop, one of which will be used for a heavy forge, and will be equipped with special tools, such as a 4 tons steam hammer, with hydraulic cranes, furnaces, boilers, etc., complete, a small rolling mill, heavy special shearing and punching machine for cutting up old boilers, etc., into scrap, and a heavy cold saw for cutting bar iron. The other shop will be used for general purposes.

It is intended to transform the rope-driven over-head cranes in these workshops into electrically-driven machines, utilising for that and other purposes the electricity generated at the Ultimo Power-house. The machinery for this change is now under order.

We hope to publish a description of the carriage and waggon shops and equipment in our next issue.

Snow Storms and Floods.

THE weather is an unending source of comment, and whether it is fine or whether it is wet, generally gives occasion for a few remarks. The "samples" which have been experienced recently are noteworthy enough to call for extended remarks. May and June this year hold the record for two months' rainfall, and not to be outdone, July opened with a heavy fall, succeeded on the 5th instant by a remarkable fall of snow on the western and souther highlands, so heavy, indeed, as to cause a complete interruption to traffic, and for the first time in our history, to cause the trains practically to be snowed up. Fortunately, the staff were on the alert, and it is gratifying to all concerned to know that the occurrences have practically passed without any serious damage to the lines, or without any undue detention to the traffic. The officers and men in the western district worked particularly well, and the belated passengers who had to spend the night in the blocked trains, speak most highly of the courtesy and attention that were shown to them by the railway staff.

Official report notifies that on the 3rd and morning of the 4th July, heavy general rains commenced to fall over the southern and western districts of the colony, and light rains over the northern districts, with snow in many places, the fall being particularly heavy on the western line between Katoomba and Bathurst, the average depth of snow being from 3 to 4 feet, and rising to 8 feet on the rails in some of the cuttings.

In consequence of these abnormal weather conditions, the following delays and interruptions to traffic took place:—Southern line: On the morning of the 6th a slip of about 4 chains long, and consisting of about 1000 yards of earth, occurred in the cutting at mileage 90-20 south, between Moss Vale and Exeter. The road was promptly cleared, the up-express being delayed 25 minutes. Between Junee and Albury very heavy rains fell on the 4th, 5th, and 6th instant, and the water was close to the rails in several places. At mileage 350-75 south, near Culcairn, the water was over the rails on the 5th instant, but rapidly subsided after doing slight damage to the permanent way, which was promptly repaired. A very heavy flood occurred at Wagga, doing considerable damage in the township, but the railway line was not affected to any extent.

On the Cooma line a washaway of considerable extent occurred on the 5th, at mileage 139-40, about 7 miles from Goulburn, and the surrounding country was flooded. Passengers were transhipped at the break, and in the meantime a temporary bridge was constructed at the spot, over which the traffic was resumed at reduced speed at 8 p.m. on the 6th. A slight slip also occurred at Billilingra, but was promptly repaired, and no delay to traffic resulted.

On the Camden line the water rose 12 feet over Camden Bridge on the morning of the 5th, and all traffic had to be stopped.

South Coast line: On the South Coast line very heavy rains were experienced, and slight slips occurred at a number of places between Waterfall and South Clifton. Repairs were promptly effected, and drivers were instructed to reduce speed over the dangerous portions of the road, and keep a sharp look-out. No serious delays occurred to trains on this line.

Western line: On the western line a very heavy snow-storm occurred between Katoomba and Orange. The

Appendix 2

THE AUSTRALIA ICOMOS CHARTER FOR THE CONSERVATION OF PLACES OF CULTURAL SIGNIFICANCE
(The Burra Charter)

Preamble

Having regard to the International Charter for the Conservation and Restoration of Monuments and Sites (Venice 1966), and the Resolutions of 5th General Assembly of the International Council on Monuments and Sites (ICOMOS) (Moscow 1978), the following Charter was adopted by Australia ICOMOS on 19th August 1979 at Burra Burra. Revisions were adopted on 23rd February 1981 and on 23 April 1988.

Definitions

Article 1. For the purpose of this Charter:

1.1 *Place* means site, area, building or other work, group of buildings or other works together with associated contents and surroundings.

1.2 *Cultural significance* means aesthetic, historic, scientific or social value for past, present or future generations.

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

1.4 *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*, *reconstruction* and *adaptation* and will be commonly a combination of more than one of these.

1.5 *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 it should be treated accordingly.

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

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

1.8 *Reconstruction* means returning a *place* 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 this Charter.

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

1.10 *Compatible use* means a use which involves no change to the culturally significant fabric, changes which are substantially reversible, or changes which require a minimal impact.

Explanatory Notes

These notes do not form part of the Charter and may be added to by Australia ICOMOS.

Article 1.1
Place includes structures, ruins, archaeological sites and landscapes modified by human activity.

Article 1.5
The distinctions referred to in Article 1.5, for example in relation to roof gutters, are:

maintenance — regular inspection and cleaning of gutters

repair involving restoration — returning of dislodged gutters to their place

repair involving reconstruction — replacing decayed gutters.

Conservation Principles

Article 2. The aim of *conservation* is to retain the *cultural significance* of a *place* and must include provision for its security, its *maintenance* and its future.

Article 2
Conservation should not be undertaken unless adequate resources are available to ensure that the fabric is not left in a vulnerable state and that the cultural significance of the place is not impaired. However, it must be emphasised that the best conservation often involves the least work and can be inexpensive.

Article 3. *Conservation* is based on a respect for the existing *fabric* and should involve the least possible physical intervention. It should not distort the evidence provided by the *fabric*.

Article 3
The traces of additions, alterations and earlier treatments on the fabric of a place are evidence of its history and uses.

Conservation action should tend to assist rather than to impede their interpretation.

Article 4. *Conservation* should make use of all the disciplines which can contribute to the study and safeguarding of a *place*. Techniques employed should be traditional but in some circumstances they may be modern ones for which a firm scientific basis exists and which have been supported by a body of experience.

Article 5. *Conservation* of a *place* should take into consideration all aspects of its *cultural significance* without unwarranted emphasis on any one aspect at the expense of others.

Article 6. The conservation policy appropriate to a *place* must first be determined by an understanding of its *cultural significance*.

Article 6
An understanding of the cultural significance of a place is essential to its proper conservation. This should be achieved by means of a thorough investigation resulting in a report embodying a statement of cultural significance. The formal adoption of a statement of cultural significance is an essential prerequisite to the preparation of a conservation policy.

Article 7. The conservation policy will determine which uses are compatible.

Article 7
Continuity of the use of a place in a particular way may be significant and therefore desirable.

Article 8. *Conservation* requires the maintenance of an appropriate visual setting: e.g., form, scale, colour, texture and materials. No new construction, demolition or modification which would adversely affect the setting should be allowed. Environmental instrusions which adversely affect appreciation or enjoyment of the *place* should be excluded.

Article 8
New construction work, including infill and additions, may be acceptable, provided:

it does not reduce or obscure the cultural significance of the place

it is in keeping with Article 8.

Article 9. A building or work should remain in its historical location. The moving of all or part of a building or work is unacceptable unless this is the sole means of ensuring its survival.

Article 9
Some structures were designed to be readily removable or already have a history of previous moves, e.g. prefabricated dwellings and poppet-heads. Provided such a structure does not have a strong association with its present site, its removal may be considered.

If any structure is moved, it should be moved to an appropriate setting and given an appropriate use. Such action should not be to the detriment of any place of cultural significance.

Article 10. The removal of contents which form part of the *cultural significance* of the *place* is unacceptable unless it is the sole means of ensuring their security and *preservation*. Such contents must be returned should changed circumstances make this practicable.

Conservation Processes

Preservation

Article 11. *Preservation* is appropriate where the existing state of the *fabric* itself constitutes evidence of specific *cultural significance*, or where insufficient evidence is available to allow other conservation processes to be carried out.

Article 11
Preservation protects fabric without obscuring the evidence of its construction and use.

The process should always be applied:

where the evidence of the fabric is of such significance that it must not be altered. This is an unusual case and likely to be appropriate for archaeological remains of national importance;

where insufficient investigation has been carried out to permit conservation policy decisions to be taken in accord with Articles 23 to 25.

New construction may be carried out in association with preservation when its purpose is the physical protection of the fabric and when it is consistent with Article 8.

Article 12. *Preservation* is limited to the protection, *maintenance* and, where necessary, the stabilization of the existing *fabric* but without the distortion of its *cultural significance.*

Article 12
Stabilization is a process which helps keep fabric intact and in a fixed position. When carried out as a part of preservation work it does not introduce new materials into the fabric. However, when necessary for the survival of the fabric, stabilization may be effected as part of a reconstruction process and new materials introduced. For example, grouting or the insertion of a reinforcing rod in a masonry wall.

Restoration

Article 13. *Restoration* is appropriate only if there is sufficient evidence of an earlier state of the *fabric* and only if returning the *fabric* to that state reveals the *cultural significance* of the *place.*

Article 13
See explanatory note for Article 2.

Article 14. *Restoration* should reveal anew culturally significant aspects of the *place.* It is based on respect for all the physical, documentary and other evidence and stops at the point where conjecture begins.

Article 15. *Restoration* is limited to the reassembling of displaced components or removal of accretions in accordance with Article 16.

Article 16. The contributions of all periods to the *place* must be respected. If a *place* includes the *fabric* of different periods, revealing the *fabric* of one period at the expense of another can only be justified when what is removed is of slight *cultural significance* and the *fabric* which is to be revealed is of much greater *cultural significance.*

Reconstruction

Article 17. *Reconstruction* is appropriate only where a *place* is incomplete through damage or alteration and where it is necessary for its survival, or where it reveals the *cultural significance* of the *place* as a whole.

Article 18. *Reconstruction* is limited to the completion of a depleted entity and should not constitute the majority of the *fabric* of a *place.*

Article 19. *Reconstruction* is limited to the reproduction of *fabric*, the form of which is known from physical and/or documentary evidence. It should be identifiable on close inspection as being new work.

Adaptation

Article 20. *Adaptation* is acceptable where the *conservation* of the *place* cannot otherwise be achieved, and where the *adaptation* does not substantially detract from its *cultural significance.*

Article 21. *Adaptation* must be limited to that which is essential to a use for the *place* determined in accordance with Articles 6 and 7.

Article 22. *Fabric* of *cultural significance* unavoidably removed in the process of *adaptation* must be kept safely to enable its future reinstatement.

Conservation Practice

Article 23. 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*.

Article 24. Study of a *place* by any intervention in the *fabric* or by archaeological excavation should be undertaken where necessary to provide data essential for decisions on the *conservation* of the *place* and/or to secure evidence about to be lost or made inaccessible through necessary *conservation* or other unavoidable action. Investigation of a *place* for any other reason which requires physical disturbance and which adds substantially to a scientific body of knowledge may be permitted, provided that it is consistent with the conservation policy for the *place*.

Article 25. A written statement of conservation policy must be professionally prepared setting out the *cultural significance* and proposed *conservation* procedure together with justification and supporting evidence, including photographs, drawings and all appropriate samples.

Article 26. The organisation and individuals responsible for policy decisions must be named and specific responsibility taken for each such decision.

Article 27. Appropriate professional direction and supervision must be maintained at all stages of the work and a log kept of new evidence and additional decisions recorded as in Article 25 above.

Article 28. The records required by Articles 23, 25, 26 and 27 should be placed in a permanent archive and made publicly available.

Article 29. The items referred to in Articles 10 and 22 should be professionally catalogued and protected.

Words in italics are defined in Article 1.

Article 25
The procedure will include the conservation processes referred to in Article 1.4 and other matters described in Guidelines to the Burra Charter: Conservation Policy.

APPENDIX 3

Select Bibliography

National Trust of Australia File D. Godden, Feb. 1986

Eveleigh Railway Workshops Heritage Study volumes 1-3 1986

Bonds & Agreements for Contracts 1871 - 95
held in the city archives (city 4/6585-87 2/934 - 93)

Railways: Contracts & Specifications 1878-99
held in the city archives (city 2/897-918)

Railways: Plans & Specifications 1859 - 1913

NSW Govt. tender list 1876

Eveleigh Locomotive 1916 Workshops - New South Wales Government Railways
Unfinished report held in the State Rail Archives ref. 2F/E

The Locomotive Shops at Eveleigh NSW Railway budget publishing office.
pp 239-140 & 229 Aug. 1900

Origin & Growth of Eveleigh Railway, the staff tramway magazine Feb. 18, 1930

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Facsimile (02) 332 3458

MEMORANDUM

3 pages

ref: Glast295
Job: **EVERLEIGH**

Re:

To: **Professor John Glastonbury**
Dean / Faculty of Engineering

From: **Don Gazzard**

Copies to: File 9179

Date: 29.5.1992

We have converted all the imperial drawings of the Everleigh buildings to metric and now have on our computer a base drawing (attached) showing the three buildings in question.

We will convert this base plan into a coloured drawing showing how the buildings will be converted and what the 'gateway' space between them will look like.

I thought it might be helpful to get an idea of how much money might be involved in constructing what is being discussed so I got our Quantity Surveyor to estimate the costs (see attached).

Split up to include fees the costs are as follows:

AGSEI	$1,035,000
The Innovation Centre	$8,335,000
Siteworks and Landscaping	$1,735,000
TOTAL	$11,100,000

Perhaps we can discuss when you visit our office next Tuesday?

Regards,

Don't forget to bring in the old coloured engineering drawings some time — I'd like to see them.

PAGE KIRKLAND PARTNERSHIP

BROAD ORDER OF COST ESTIMATE OF LIKELY CONSTRUCTION COSTS

THE UNIVERSITY OF SYDNEY

PROPOSED AUSTRALIAN GRADUATE SCHOOL OF ENGINEERING INNOVATION

Refurbish existing two storey works manager's office by converting into offices/lecture and conference facilities with new - internal layout, toilets, finishes, air-conditioning, electrical and fire services with minor upgrading of facade.
(approx. floor area 1,200 m^2) 950,000.00

THE INNOVATION CENTRE

Conversion of existing "New Engine Workshop" into a new facility comprising lecture rooms, theatrettes, offices, meeting rooms, laboratories, storage areas and amenities by cleaning facade and upgrading windows and doors, new suspended mezzanine floor, replace roof covering, new stairs, internal partitions, doors, finishes, built-in fittings, air-conditioning, electrical and fire services.
(approx. floor area 6,030 m^2) 7,650,000.00

EXTERNAL WORKS ASSOCIATED WITH ABOVE TOW BUILDINGS

Site clearance, new hard paving, planters, grass areas, plants, shrubs, trees, irrigation, fences, external furniture, signage, stormwater drainage and lighting.
(overall area approx. 14,000 m^2) 1,600,000.00

PROFESSIONAL FEES

Provision for all Consultants Fees.
(approx. 9% -)say 900,000.00

TOTAL $11,100,000.00

PAGE KIRKLAND PARTNERSHIP

BROAD ORDER OF COST ESTIMATE OF LIKELY CONSTRUCTION COSTS

THE UNIVERSITY OF SYDNEY

EXCLUSIONS FROM THE ESTIMATE

1. Future increases in labour and material.

2. Cost of land, interest and finance charges.

3. Authorities DA and BA fees (if applicable).

4. Loose furniture and equipment and special laboratory research equipment.

Gazzard Sheldon Architects

Gazzard Sheldon Pty Ltd is an architectural and planning firm which provides a high level of professional consulting services to the private and public sector in Australia, Asia and the Pacific Region.

The firm is an independent and flexible organisation with access to professional associates in related disciplines throughout Australia and can provide a consulting team tailored to each clients' specific requirements.

Gazzard Sheldon Architects have a proven record of producing buildings that make sense economically, functionally and aesthetically and have gained many awards for design excellence.

The firm can provide any or all of the following professional services:

Preliminary site selection studies
Town planning and urban design advice
Assistance in formulating a brief
Preparation of detailed functional requirements
Design studies
Reports on financial feasibility
Life cycle costing
Architectural design
Construction documentation
Interior design
Landscape design
Specification of materials
Selection of colour schemes and furniture
Co-ordination of sub-consultants
Projects cost and time control
Evaluation of tenders
Procurement of equipment and furniture
Administration of building contracts
Supervision of construction
Project management

GSa

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