

volume 1

eveleigh railway workshops



heritage study

A HERITAGE STUDY
OF
EVELEIGH RAILWAY WORKSHOPS

By
Don Godden & Associates

Prepared on behalf of :

The Heritage Council of N.S.W.

The State Rail Authority of N.S.W.

The National Trust of Australia (N.S.W.)

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INTRODUCTION

Eveleigh Railway Workshops covers a site of eight hectares close to the centre of Sydney at Redfern and comprises some forty buildings and structures of various sizes and types. It is divided down its east/west axis by the tracks of the Suburban, Southern and Western Railway Lines, the southern side being designated as the Locomotive Workshops and the northern side being the Carriage Workshops.

The Locomotive Workshops were predominantly a heavy engineering works capable of the manufacture of every component of a steam locomotive and included areas set aside for assembly, disassembly, repair and maintenance of every aspect of these machines. These shops also manufactured the wheels, axles and the iron and steel chassis of railway rolling stock which was manufactured, assembled and maintained in the adjacent Carriage Workshops. The Carriage Workshops performed all aspects of manufacture and maintenance of the carriages, waggon and vans used in the railway system of N.S.W., much of this work being executed in timber and sheet metal.

The site is bound on the north by Wilson Street and the south by the Alexandria Goods Yards, now resumed and being developed by the Housing Commission of N.S.W. The eastern boundary follows Eveleigh Street, Redfern Railway Station, Cornwallis Street and Garden Street and the western boundary is formed by Ivers Lane, Copeland Avenue, Macdonaldtown Railway Station and Burren Street. The Carriage Workshops occupy about one third of the total site.

The Eveleigh Workshops took five years in planning and over that time the original concept was developed and expanded to the final plan of a complete, self-contained railway workshops using the best and most

advanced technology of the time. The foundations and footings of the major buildings were designed in 1883 and construction commenced in 1884 while the buildings themselves were still being designed.

Construction of the workshops was underway in 1886 while the annexes to these were being designed to be attached to the southern side of the workshops. The complex was officially opened in 1887, although the backlog of work was such that each section was brought into operation almost as soon as it was completed. Additional buildings continued to be constructed until well into the twentieth century.

The site of Eveleigh Workshops still contains buildings and structures developed as part of the original grand scheme for Eveleigh. Generally, they are built of stone or brick laid in English Bond, with well proportioned fenestration and architectural detail that exhibit the esteem with which the people of the Victorian era regarded their railway system. Although they are functional industrial buildings, they are handsome, intricate buildings that both contained and displayed the latest in the technology of the period.

The first buildings in the locomotive complex were the main workshops of fifteen bays, the Timekeepers Office and the Engine Running Shed. In 1899 construction commenced on the Large Erecting Shop, completed in stages up to 1905 and the New Loco Shop was built in 1908 for the manufacture of new steam engines. In the Carriage works, the main workshops bays 16-25, the Paint Shop and the Chief Mechanical Engineers Office situated on the hill overlooking the workshops represent the original core of buildings. No building erected after this time exhibits the same care in design or quality of materials and the majority of the later structures are simple timber or steel frames clad in

corrugated iron or aluminium sheet.

As the twentieth century progressed, the railway network grew and the operations at Eveleigh expanded. New buildings were erected and existing buildings were altered to accommodate changes in function and changes in technology and technique. These alterations to the fabric of the buildings bear witness to the continuing social and technological changes that took place over almost a century of operation.

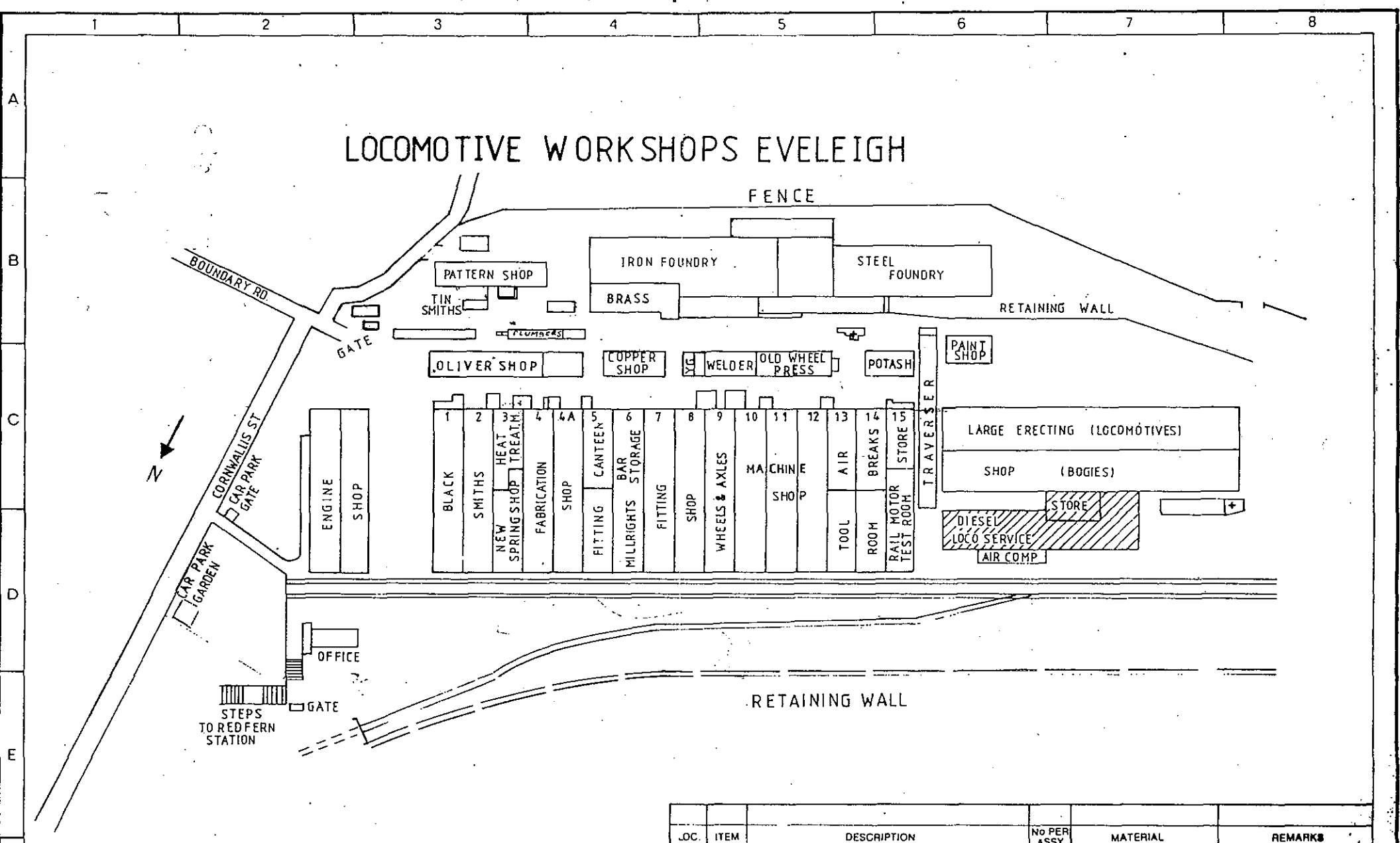
The de-evolution of railway architecture during the twentieth century is clearly apparrant at Eveleigh. As time progressed, additional buildings exhibited less and less architectural design, culminating most graphically in 1963 with the demolition of the final section of the elegant Engine Running Shed and the construction in its place of the purely functional steel-framed, pressed-aluminium clad Air-conditioned Car Depot. The sense of strength and permanence that pervades the design of the Victorian railway buildings is, like the technology of the steam engines around which Eveleigh had been designed, totally gone by the 1960's to be replaced by ad-hoc buildings and the architecture of expediency. Regrettable though this may seem in retrospect, it was an inevitable feature of the period and an integral element in the history of the workshops.

In the present day it has been recognized that the buildings and structures of workplaces such as Eveleigh represent a valuable resource as a social and historical document. Eveleigh is no longer the centre of mechanical activity for the N.S.W. Railways though it retains a small role as a heavy engineering and a foundry works. Whichever way this role may develop in the future, perhaps Eveleigh's greatest contribution is as a physical record of a century of development of railway technology and

further as a permanent reminder that man's achievement is through both the labour of the engineers and designers and the labour of every blacksmith, machinist and greaser that contribute to the greater development of the industry.

It is not suggested that a sterile museum of artefacts should arise on the site but with consideration and care for the historic environment, the Eveleigh Workshops can fulfil a role that exists in modern terms which is both complementary to, and a natural continuation of, its central role in the development of the railways system of N.S.W.

LOCOMOTIVE WORKSHOPS EVELEIGH



AMENDMENTS

(B) REMOVAL OF OLD SPRING JOP CHANGE RAIL MOTORS TO ENGINE SHOP. E.O.M 1/8/85. L.H.K.D. *Johnston*

DRAWING REFERENCE
E 10089
LWE 1-10592

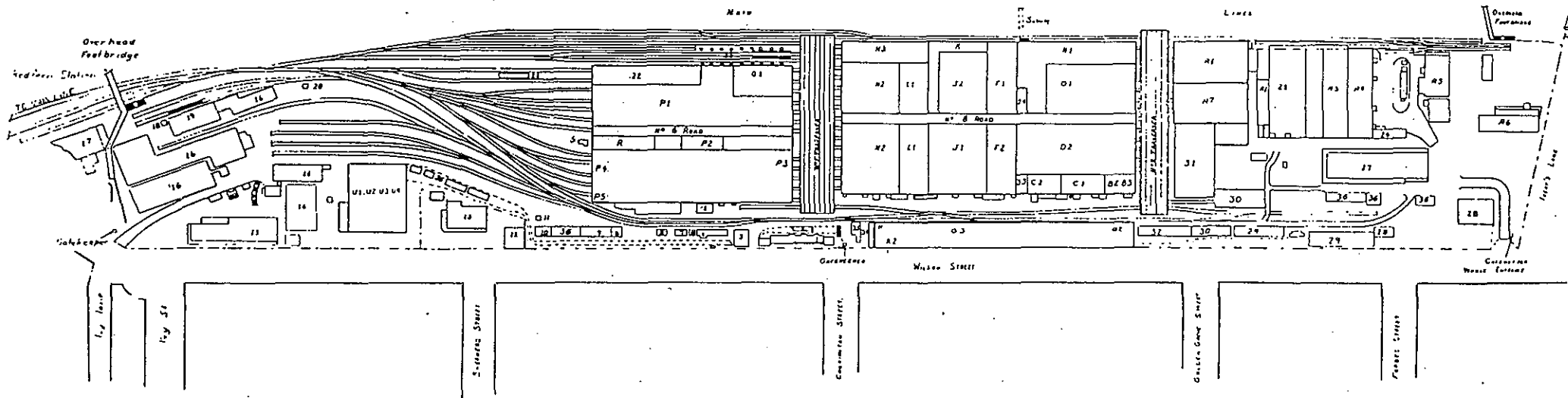
WORKS MANAGER
Johnston

LOC.	ITEM	DESCRIPTION	No PER ASSY	MATERIAL	REMARKS
		LOCOMOTIVE WORKSHOPS EVELEIGH			3 LWE 3-11777
		EVELEIGH LOCOMOTIVE WORKSHOPS			<input checked="" type="checkbox"/> B
PROJECTION					SCALE

CARRIAGE WORKS EVELEIGH LAYOUT OF WORKSHOP

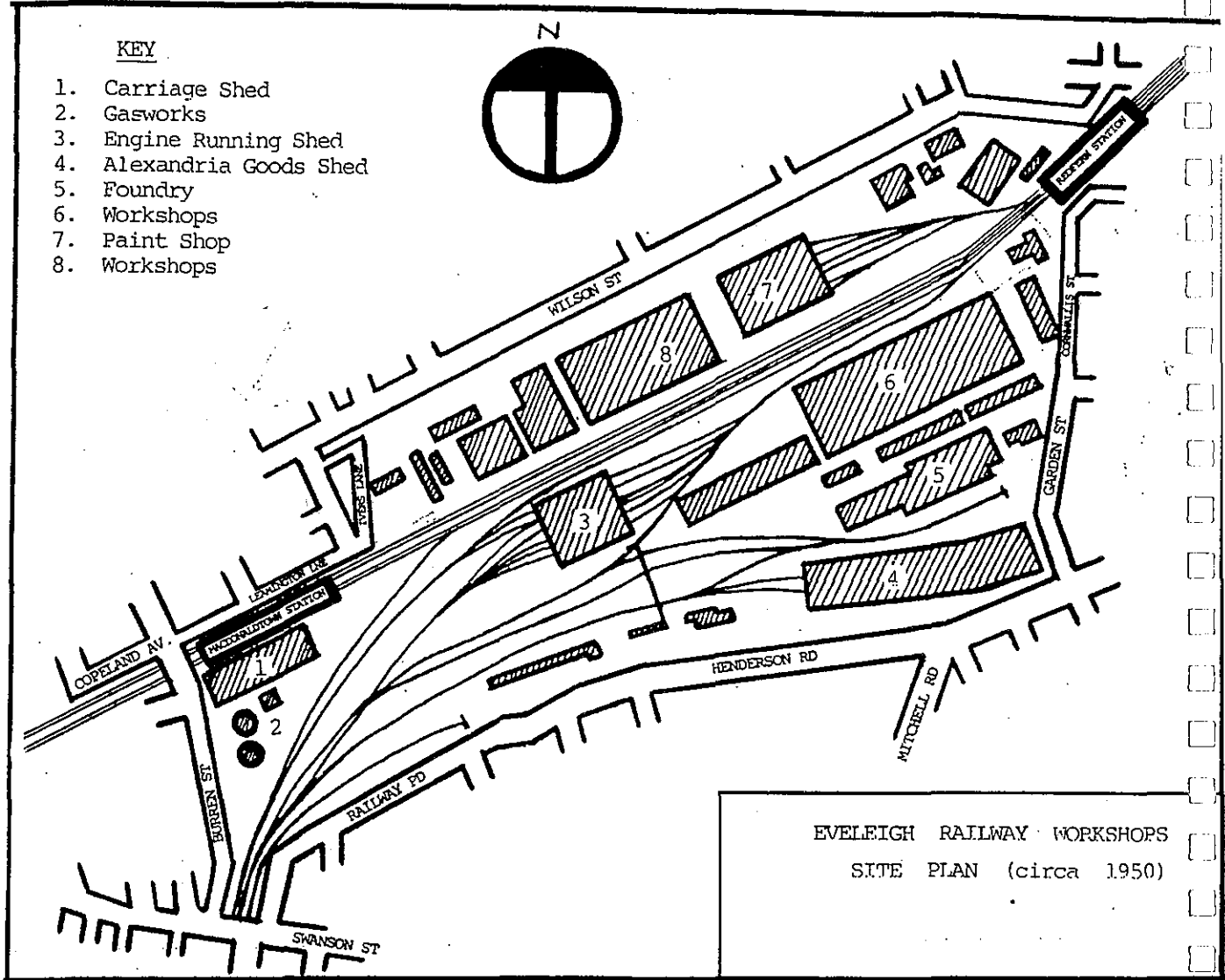
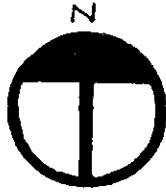
(4443)

1	WORKS MANAGERS OFFICE	24	CENTRAL CONTROL OFFICE	A1	CARRIAGE REPAIRS—APPRENTICES	N1	BOGIE SECTION—COMPOSITION TYPE
2	SAFETY OFFICERS BUILDING	25	CARRIAGE WORKS STORE—STORES BRANCH	A2	BATTERY BOX SECTION	N2	BOGIE SECTION—STEEL TYPE
3	COMPRESSOR HOUSE	26	HOSTEL CANTEEN	A3	CARRIAGE SEATS	N3	RAILMOTOR FITTERS & BOGIES
4	PLANNING OFFICE	27	HOSTEL	A4	SPRAY PAINT SECTION	O1	RAILMOTOR SECTION
5	ENGINEERS OFFICE	28	ADVERTISING DEPOT, WORKSHOP & STORE	A5	SHEET METAL SHOP	P1	CARRIAGE REPAIRS—SCHEDULES
6	MANCO SHEDS	29	STORE—STORES BRANCH	A6	AXLE BOX LUBRICATORS & DUST SHIELDS	P2	PAINT SHOP STORE
7	EVELEIGH SWITCH HOUSE—ELECTRICAL	30	EASTING STORE—STORES BRANCH	A7	NEW BOILER SHOP	P3	PAINT SECTION
8	SAND BLAST SHED	31	TIMBER STORE—STORES BRANCH	O2	APPRENTICE TRIMMERS—UPSTAIRS	P4	PAINT SECTION
9	ELECTRICIANS (MAINTENANCE)	32	POTASH TANKS	D3	MILLWRIGHTS—DOWNSTAIRS	P5	PAINT SECTION
10	HAIR TEASING	33	PLATING SECTION	C1	PLUMBERS	R	FITTING—UP SECTION—CARBUILDERS
11	FUMIGATORS SHED	34	CANTEEN & LIBRARY	C7	BRASS SHOP	S	TRAFFIC CAR REPAIRS—CARBUILDERS
12	WATER SUPPLY DEPOT	35	FIRST AID ROOM	D1	CARRIAGE REPAIRS	U1	TRIMMING SHOP—TRAFFIC VEHICLES
13	OUTWARDS PARCELS DEPOT	36	STORAGE SHEDS	D2	CARRIAGE REPAIRS	U2	TRIMMING SHOP—PAINT & A/C VEHICLES
14	TESTING LABORATORY			F1	MACHINE SHOP—AXLEBOX & BRASS BEARINGS	U3	TRIMMING SHOP—GENERAL REPAIRS
15	GENERAL MANAGER WORKSHOPS			F2	MACHINE SHOP—GENERAL	U4	TRIMMING SHOP—REPAIRS & PRODUCTION
16	TRAIN EQUIPMENT SECTION			G2	BLACKSMITHS—FORGES		
17	SIGNAL & TELEGRAPH SHOP			G3	BLACKSMITHS—MACHINES & WELDERS		
18	WELDING ENGINEERS OFFICE			H	YARD STAFF		
19	ELECTRICAL DRIVERS INSTRUCTION SCHOOL			J1	SAWMILL		
20	RAIL MOTOR FUELLING POINT			J2	SAWMILL		
21	SHUNTERS & YARD ASSEMBLERS			K	FINISHING SECTION—WOODWORK		
22	SPECIAL CARS COMPOUND			K2	CARPENTERS		
23	LIFTING CRANES			L1	BOILERMAKERS—GENERAL & JIG SECTION		



KEY

1. Carriage Shed
2. Gasworks
3. Engine Running Shed
4. Alexandria Goods Shed
5. Foundry
6. Workshops
7. Paint Shop
8. Workshops



EVELEIGH RAILWAY WORKSHOPS
SITE PLAN (circa 1950)

3.0 THE BRIEF

EVELEIGH RAILWAY WORKSHOPS PROVISIONAL BRIEF FOR HERITAGE STUDY

1.0 Preliminary work

- 1.1 Gather all primary information on development of the workshops -
from their establishment to the present - by consulting full sources
- railway archives
 - relevant libraries
 - State archives
 - Eveleigh workshops plan room, plant room and section offices etc.
- 1.2 Such material should be copied if relevant and feasible or it should be located and a catalogue produced. The extent of this catalogue will depend on the quality and quantity of documents.

2.0 Collation of Preliminary Material

- 2.1 Sort into architectural and technological sections.
- 2.2 Produce an overall contemporary plan of the works - fully annotated.
- 2.3 Produce a plan of each building - annotated - showing the position of machines, structures and equipment.

3.0 Field Work

- 3.1 Armed with information from Section 2 proceed to make a detailed assessment of both the buildings and technology.

3.2 Each building should be described in terms of structure, materials and condition.

3.3 The significant technology within each building will be described in terms of structure, materials and operation.

4.0 The Report

4.1 The report will be produced in three sections.

4.1.1 Architecture

This section is to contain comprehensive information on all the buildings or sites and the functional relationships between the buildings.

As such it will include date of construction, chronology of function, chronology of changes to the fabric plus a complete description of the building including condition.

A statement of significance will be made for each building and recommendations for the future treatment of each building.

4.1.2 Technological

This section will contain comprehensive information on the significant machines, tools, equipment and systems throughout the site.

It will include the position of each machine, its make, age, construction, history and mode of operation and its relationship to other pieces of equipment and machines.

A statement of significance will be made for each machine and set of recommendations for future treatment of the machines.

4.1.3 Nomination for inclusion in the Register of the National Estate

As a separate section of the report the consultant will be required to produce a complete and comprehensive report and National Estate nomination form.

As well as any copies of the report required by the Heritage and Conservation Branch of the Department of Environment and Planning, full copies (including plans and photographs) are to be provided to the State Rail Authority of New South Wales and The National Trust of Australia (New South Wales).

CONSTRAINTS

In the execution of this study, the size and complexity of Eveleigh Workshops when examined in detail was such that in trying to meet the demands of time and cost as outlined in the Brief, enormous constraints were placed on the range and depth of study achievable by the authors for this report. At the end of the study, a large number of photographs of machinery and workshops remained that show the internal appearance of the buildings and machinery not covered by the relevant Registers for Conservation and Recording. These photographs are presented as the Appendices, but still require full documentation and cataloging.

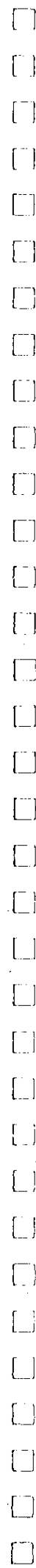
Although not specifically required by the brief, it was found essential that a comprehensive history of the site be prepared before meaningful work on the assessment of buildings and machinery could proceed. This history was prepared and forms the bulk of Section 1.

In terms of the full extent of the brief, the following areas were not addressed:

- a) No consideration has been given to the relocation of machinery that has been recommended for conservation.
- b) No consideration has been given to the relocation of patterns and templates that have been recommended for conservation.
- c) No recommendations are made as to possible re-uses for any of the buildings which are recommended for conservation, nor has any account been taken of the expense of conservation and the extent of measures which would have to be taken to conserve the buildings.

5.0 AUTHORS

Overall Supervision & Management	D. Godden
Assessment	D. Godden
Historical Documentation	A. Brassil
Historical Research	A. Brassil, I. Empson, D. McCarroll
Documentation & Catalogue of Buildings & Machinery	I. Empson, D. McCarroll
Photography	I. Empson
Drawing	D. McCarroll
Editing & Layout	D. Godden, A. Brassil



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- Mr. W. Bullock - Deputy General Manager of Workshops.
- Mr. J. Bruce - General Supervisor, Locomotive Workshops.
- Mr. T. Payne - General Supervisor, Carriage Workshops.
- Mr. K. Cooper - Technical Engineer, Carriage Workshops.
- Mr. B. Cummins - Architect, Architect's Branch.

In particular, Mr. Jack Bruce gave generously of his time and advice. Without his constant forbearance, knowledge and assistance, the authors' task would have been far more difficult. The Archives Section and the Architects Branch of the State Rail Authority were also most accessible and co-operative, as were the staff and foremen around the workshops.

DOCUMENTARY SOURCES

PHOTOGRAPHS

Historical photographs used in this report were all obtained from the photo files held by the Archives Section of the State Rail Authority.

Photographs of the Workshops in 1985 and 1986 were taken by I. Empson, D. McCarroll and D. Godden.

PLANS AND DRAWINGS

Plans and drawings used in this report were obtained from a variety of sources within the State Rail Authority. Principal sources were the Archives Section, especially their Microfiche system, the Plan Room of the Architects Branch, the Drawing Office for the Locomotive Workshops and the Production Office of the Carriage Workshops.

WRITTEN REFERENCES

The historical information in this report was largely compiled from information held in the Archives Section of the State Rail Authority. A great deal of this was obtained from the card index of the Archives, itself compiled from Annual Reports, Railway Budgets and miscellaneous Shop Orders by the Archives Section staff. Other material was taken from articles, reports and occasional papers also held by the Archives Section. A select bibliography of them is printed at the end of the History and Development Section.

STRUCTURE OF THIS REPORT

This report has been produced in three volumes, each volume representing a major section of the report.

Volume 1 contains the Introductory Section and Part 1 of the report. The Introductory Section contains the site plans, brief, constraints placed on the study, author identification, acknowledgements, documentary sources, the Statement of Significance and a summary of the Recommendations. This section can be separated from the rest of this volume, Part 1 of the report. Part 1 - Background - consists of the history and development of Eveleigh Railway Workshops and a description of operations at Eveleigh as they exist at present.

Volume 2 contains only part 2 of the report, the Building Assessment section. This part contains an introductory section followed by summary lists of buildings recommended for conservation or recording. These lists are followed by photographs and building cards containing the information and description of each building on the site. The buildings of the Locomotive Workshops are dealt with before the buildings of the Carriage Workshops and the order is such that buildings recommended for conservation are placed before those being recommended for recording. The building information card for each building contains information as it is known on the construction, condition, date of erection and subsequent alterations to the building, as well as the heritage assessment and a location sketch.

Volume 3 contains only part 3 of the report, the Machinery and Equipment Assessment section. It comprises an introductory section followed by summary lists of machinery recommended for conservation and recording. The machinery in the Locomotive Workshops is dealt with before the machinery in the Carriage Workshops and machinery recommended for conservation is placed before machinery recommended for recording. The lists are followed by the photographs and machinery information cards for each machine. A scale drawing of each building or workshop bay is shown prior to the photographs and information cards for the machinery shown in that location.

Volume 4 of the report contains only Part 4 of the report, the Appendices, which contain supplementary photographs of the buildings and machinery.

STATEMENT OF CULTURAL SIGNIFICANCE

PRINCIPAL STATEMENT OF SIGNIFICANCE

Eveleigh Railway Workshops contains the finest examples of late Victorian large industrial buildings in N.S.W.

Eveleigh Railway Workshops contains the most complete set of late-nineteenth and early-twentieth century light and medium engineering technology in Australia.

When built, Eveleigh Railway Workshops were the largest and most advanced railway workshops in Australia.

In their size and importance, Eveleigh Railway Workshops indicate the significant role that the N.S.W. railway system has played in the development of N.S.W.

ARCHITECTURAL

Eveleigh Railway Workshops complex contains the finest examples of the late 19th century large industrial buildings in N.S.W.

The earliest buildings on the site display precisely detailed polychrome brickwork and elegantly refined facades and have both strong period and a strong functional character.

The interiors of the main workshops are carefully detailed with cast-iron columns supporting a tracery of thin section wrought-iron roof trusses and lattice girders. The wide span of the roof trusses, combined with the length of the shed bays, produce impressively large interior spaces.

The New Loco and Large Erecting Shops display well formed sandstone copings and window sills, with rhythmic symmetrical facades containing well detailed plinths, string courses and impressive polychrome triple brick arches above windows and other openings.

The huge timber doors common to the large buildings of Eveleigh Locomotive Workshops impressively illustrate the scale and solidity of late 19th century industrial architecture.

The Works Managers' Office, recently restored and completed by the reinstatement of its' finely detailed iron lace bell-tower, displays the growth and importance of the workshops in its three stages of building development. The bell-tower and time keeping arrangements are an interesting relic of earlier work management practices.

TECHNOLOGICAL AND SCIENTIFIC

Eveleigh Railway Workshops contain the most complete set of late nineteenth and early twentieth century light and medium engineering technology in Australia.

The steam operated Davy 1800 ton press is the largest operating steam press in Australia.

The steam hammers, some of which date from the nineteenth century, represent the most comprehensive collection of operating steam hammers in Australia.

The hydraulic system, with its steam pump and early electric pump, is the only known operating example of its kind in Australia.

The footings for the main locomotive workshops, which were formed by brick segmental arches springing from brick plinths laid on wooden platforms, represent an ingenious method of erecting such a massive building on a sandy foundation.

The main locomotive workshops, with twin hollow cast-iron columns (which not only support the roof and carry the overhead cranes but also act as downpipes for rainwater) and thin wrought-iron roof trusses represent the epitome of building construction in the mid to late nineteenth century.

The cast-iron columns of the main workshops are perhaps the finest surviving examples of the work of the Globe Foundry of Sydney.

The main locomotive workshops house perhaps the best collection of overhead cranes in N.S.W., the oldest dating from 1884.

The wrought-iron roof trusses spanning extremely wide spaces, together with the length of the shed bays, made the main workshops building at Eveleigh one of the largest continuously covered industrial spaces in Australia at the time of its construction.

HISTORICAL

When built the Eveleigh Railway Workshops were the largest railway workshops in Australia.

The workshops were conceived in 1872-75 by John Whitton who remains as the most influential figure in the history of the N.S.W. railways system.

The workshops were responsible for producing over two hundred locomotives including the famous C36 and C38 class. The vice regal carriages of the N.S.W. SRA which were also built at Eveleigh are among the finest in the world.

The Eveleigh workshops buildings are good examples of the works of George Fishburn, John Ahern and Harold Norris who were prominent Sydney builders of the late 19th century.

SOCIAL

Eveleigh Railway Workshops, in its size and importance, indicates the vital part that the N.S.W.G.R. has played in the development of New South Wales.

Eveleigh has played a significant role in the development of the local area by providing a wide range of employment and was one of the largest employers in Sydney at the turn of the century.

The bulk and presence of the workshops has been a dominating influence in the development of the character of South Sydney.

10.0 RECOMMENDATIONS

LOCOMOTIVE WORKSHOPS

BUILDINGS RECOMMENDED FOR CONSERVATION

The following buildings have been recommended for conservation:

- 1) Works Managers Office
- 2) Main Workshops, Bays 1-15
- 3) Large Erecting Shop
- 4) New Locomotive Shop
- 5) Water Tank
- 6) Gasometer and Pumps

LOCOMOTIVE WORKSHOPS

BUILDINGS RECOMMENDED FOR RECORDING

The following buildings have been recommended for recording:

- 1) Foundry
- 2) Pattern Shop
- 3) Potash Shop
- 4) Old Wheel Press Shop
- 5) Oliver Shop
- 6) First Aid Station
- 7) Sand Depot
- 8) Ways and Works Branch Buildings
- 9) Locksmith and General Workshop, Signal and Communication Branch
- 10) Interlocking Fitters, Signal and Communication Branch
- 11) Battery and Electrical Shop, Signal and Communication Branch
- 12) Battery Depot, Signal and Communication Branch
- 13) Store, Signal and Communication Branch
- 14) Diesel Locomotive Service Depot
- 15) Air Compressor House
- 16) Air-Conditioned Locomotive Depot
- 17) Office and Amenities Building
- 18) Locomotive Washing Shed

CARRIAGE WORKSHOPS

BUILDINGS RECOMMENDED FOR CONSERVATION

The following buildings have been recommended for conservation:

- 1) Administration Building, Former Chief Mechanical Engineers Office

CARRIAGE WORKSHOPS

BUILDINGS RECOMMENDED FOR RECORDING

The following buildings have been recommended for recording:

- 1) Main Workshops, Bays 16-25
- 2) Paint Shop
- 3) Electrical Stores
- 4) Carriage Repairs and Apprentices Shop
- 5) Stationery Store
- 6) Blacksmiths Shop
- 7) Trimming Shop
- 8) Timber Store
- 9) First Aid Station
- 10) Submerged Connection Tunnel beneath Main Lines
- 11) Hostel Residence
- 12) Carriage Seats and Battery Box Shop
- 13) Train Equipment Section
- 14) Outward Parcels Depot
- 15) Asbestos Removal Building
- 16) Paint Shop Extension
- 17) Spray Paint Section
- 18) Sheet Metal Shop
- 19) Electrical Drivers Instruction School
- 20) Testing Laboratory
- 21) Womens Hostel
- 22) Compressor House

23) Axle Box Lubricator and Dust Shield Shop

24) Old Materials Testing Laboratory

LOCOMOTIVE WORKSHOPS

MACHINES RECOMMENDED FOR CONSERVATION

The following machines have been recommended for conservation.

MACHINE	LOCATION
1) 1500 ton Steam Press, Davy Bros.	Bay 1, north
2) Punch, Bretts	Bay 1, south
3) 7 cwt electropneumatic hammer, B & S Massey	Bay 1, south
4) Rootes Blowers No's 6,5 and 6, Thwaites Bros.	Bay 1, south
5) 40 cwt steam hammer, Departmental	Bay 1, south
6) 20 cwt steam hammer, Davis & Primrose	Bay 1, south
7) Electric shears, De Burgue	Bay 1, south (annexe
8) 8.5 cwt steam hammers (4), Davis & Primrose	Bay 2, north
9) Horizontal forging machine, Coventry Machine Tool	Bay 2, south
10) Continuous forging machine, Ajax Manufacturing Co.	Bay 2, south
11) Oliver hammers (4), Cardiff Junction D.D.& E. Co.	Bay 2, south
12) 2 cwt pneumatic hammers (2), B & S Massey	Bay 2, south
13) C36 class boilers (4), Departmental	Bay 2, south (annexe
14) Spring turner, F.E. Whitham Standard Tool Co.	Bay 3, north
15) 72" Spring forming machines (2), Ryerson	Bay 4, north
16) Hydraulic spring buckling press, Fielding and Platt	Bay 4, north
17) Hydraulic spring stripper, Craven Bros.	Bay 4, north
18) Spring coilers (2), John Lang & Sons	Bay 4, north
19) Metal shears, J. Bennie & Sons	Bay 4, south

20) Horizontal plate roller, Craven Bros	Bay 4, south
21) Hydraulic power system	Bay 4, south (annex)
22) Steam hydraulic pressure pump, Fielding and Platt	Bay 4, south (annex)
23) Electric hydraulic pressure pump, Hat, Horn & Davey	Bay 4, south (annex)
24) Vertical press, Beyer Peacock	Bay 6, south
25) 18" Stroke slotter, Ormorod Shapers	Bay 10, south
26) Universal grinder, Browne & Sharpe	Bay 14, north
27) Universal Tool and cutter grinder, Herbert	Bay 14, north
28) 10" Centre relieving lathe, Reinecker	Bay 14, north
29) Core making machine, Departmental	Foundry
30) Core making machine, Wadsworth	Foundry
31) Underdriven pan crusher, Departmental	Foundry
32) 35 ton overhead crane, Craven Bros	New Loco Shop
33) Type 10 air compressor, Ingersoll Rand	Compressor House
34) 1500 c.f.m. air compressors (2), Thompson Castlemaine	Compressor House
35) Jib/pedestal crane, Heighty Berry and Co.	Wheel Press Shop
36) Jib/pedestal crane, Heighty Berry and Co.	Wheel Press Shop
37) Hydraulic wheel press, Fielding Platt	Wheel Press Shop
38) Bandsaw, Wadkin	Pattern Shop
39) Bandsaw,	Pattern Shop
40) Traverser, Craven Bros.	External
41) 35 foot turntable, Craven Bros.	Sand Depot
42) 10 foot hand-operated Turntables (various)	External

LOCOMOTIVE WORKSHOPS

MACHINES RECOMMENDED FOR RECORDING

The following machines are recommended for recording:

MACHINE	LOCATION
1) Spring end grinder	Bay 3, north
2) Small spring Coilers (2), Smith & Coventry	Bay 3, south
3) Eye Rolling Machine, Springking	Bay 3, south
4) Hydraulic Press/Leaf Spring Tester, Departmental	Bay 4, north
5) Odi Radial Arm Drill, W.M. Asquith	Bay 4, north
6) 6 foot Plate Roller, Departmental	Bay 4, south
7) 72" by 27" Grinder, Churchill Machine Co.	Bay 8, south
8) Lathe-Axle & Journal, Craven Bros.	Bay 9, north
9) Single Bed Vertical Borer with Dual Heads, Richards	Bay 9, north
10) Dual Vertical Boring Machine, Webster & Bennett	Bay 9, north
11) 48" Wheel Lathe, Tangye	Bay 9, south
12) Metal Shaper, Graham & Normanton	Bay 10, north
13) Odi Radial Arm Drills (2), W.M. Asquith	Bay 10, north
14) 6 foot Radial Arm Drill, American Tool Co.	Bay 10, north
15) Sensitive Drills (2), Herbert, Archdale	Bay 10, north
16) Centre Lathe, Denham Engineering Co.	Bay 10, south
17) Planer, Butler Machine Tool Co.	Bay 10, south
18) Hydrotel Mill, Cincinatti Milling Machine Co.	Bay 12, north
19) Horizontal Borer-D5, H.W. Kearns & Co.	Bay 12, south
20) Horizontal Borer, H.W. Kearns & Co.	Bay 13, north

- | | |
|---|------------------|
| 22) Piston Rod Grinder, Churchill Machine Co. | Bay 13, north |
| 23) 72" x 12" Grinder, Cincinatti | Bay 13, north |
| 24) No. 12 Centreless Grinder, Herbert | Bay 13, north |
| 25) Camshaft Grinder, Churchill | Bay 13, south |
| 26) Bevan Universal Milling Machine, Thiel | Bay 14, north |
| 27) No.4 Universal Milling Machine, Browne
& Sharp | Bay 14, north |
| 28) Air Compressor - 220 c.f.m., Atlas Copco. | Compressor House |

CARRIAGE WORKSHOPS

MACHINES RECOMMENDED FOR CONSERVATION

The following machines are recommended for conservation:

MACHINE	LOCATION
1) Cross cut Saw, T. Robinson	Bay 19, North
2) Planing machine, T. Robinson	Bay 19, North
3) Vertical 3 spindle borer, A. Ransom	Bay 19, South
4) Box frame saw, T. Robinson	Bay 20, north
5) Lineshaft, disused	Bay 20,
6) Rip saw, Circular, W.B. Haig	Bay 20, south
7) Slotting machine, Butler Machine Tool Co.	Bay 21, north
8) Tools and toolrack, NSWGR	Blacksmiths shop
9) Steam hammer, 7 1/2 cwt, Pilkington	Blacksmiths shop
10) Steam hammer (Allen Oliver) Cardiff Dock	Blacksmiths shop.

CARRIAGE WORKSHOPS

MACHINES RECOMMENDED FOR RECORDING

The following machines are recommended for recording:

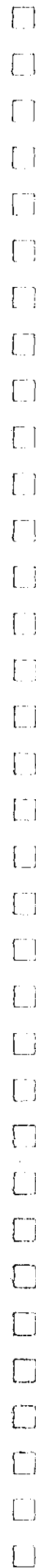
MACHINE	LOCATION
1) 75 ton hydraulic press, Departmental	Bay 18, north
2) Electropneumatic Hammer, B & S Massey	Blacksmiths Shop

EVELEIGH RAILWAY WORKSHOPS

HERITAGE STUDY

PART 1

BACKGROUND



**EVELEIGH RAILWAY WORKSHOPS
HISTORY AND DEVELOPMENT
1870-1887 - THE ESTABLISHMENT OF THE WORKSHOPS**

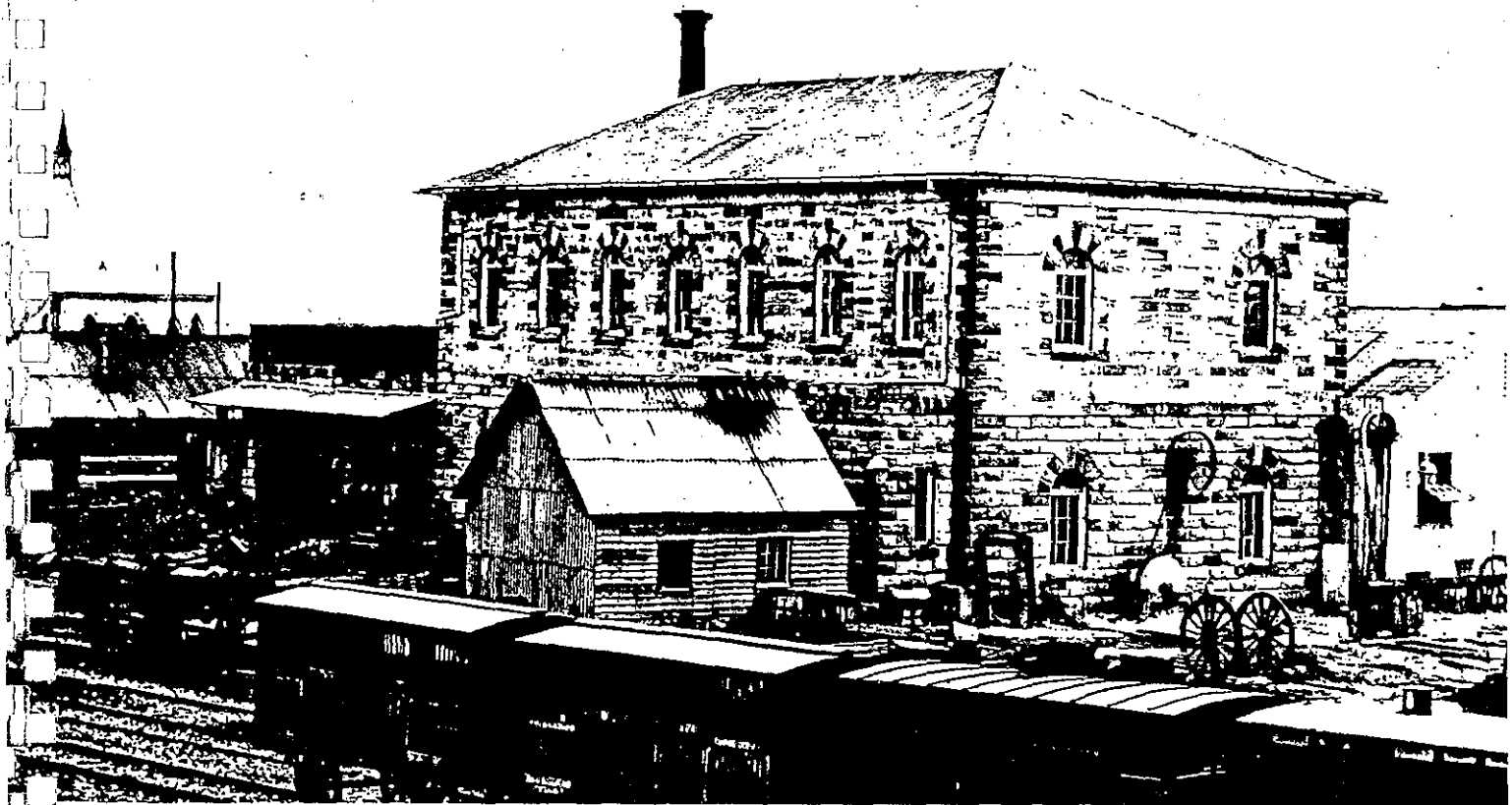
Planning for the provision of a large modern railway workshops complex at Redfern began with the proposed expansion of the existing Repair Shops in 1871. The original workshops, which were known as the Locomotive and Carriage and Wagon Repair Shops, were located towards the Redfern end of the Sydney Railway Yard in an area known as "Cleveland Paddock". They comprised a collection of corrugated-iron sheds around a two-storey stone Turning and Pattern Shop. Power for much of the works was provided by a 20hp steam engine fed by two boilers housed in an annexe to this building. Equipment in the Shops included two large and five small lathes, two steam hammers (one of 45 cwt and the other of 15 cwt) and thirteen other machines of various kinds. In 1871, it was proposed to expand and upgrade this facility in accordance with the needs of the developing rail network.

Some improvements and additions were made to the old repair workshops at this time, however, it was apparent that a new location would soon be required to allow sufficient room for expansion.

Gilder, (1905, quoted in Inst. of Eng., Syd. Div., 1922, p.2).

Fig. 1. Railway Workshops, Sydney, March 1971.

The original railway workshops were housed in a collection of sheds around a two-storey stone Turning and Pattern Shop. This building, long demolished, obviously contained machinery on the ground floor powered from a central overhead lineshaft which projects through the northern wall to drive the external grindstone. The Boiler House is on the southern side with an open arched facade and water tank on the roof. The Mortuary Station and Sydney University are apparent in the background. (B21)



By 1875, the site at Eveleigh was selected and plans and estimates prepared for a workshops complex adequate for the foreseeable future. Negotiations for the acquisition of the land commenced early in 1878 and settlement was reached in 1880 with 64.5 acres resumed from the estate of the late John Chisholm on the 1st of July at a cost of around 100,000 pounds. The resumption included the Chisholm residence known as "Calder House" on the northern side of the site, built in 1820 and used since 1855 as a boy's school.

N.S.W.R. Annual Report, 1881.

Fewtell, F., Works Manager, 14/5/55.

Clearing of the land commenced early in 1882 and construction of the Running Shed was begun while foundations for the workshops were being prepared. Late in 1882, the Department of Mines sunk a bore to 1,000 ft in search of a permanent water supply for the railways but this was unsuccessful and further exploration was not attempted.

N.S.W. Dept. of Mines Annual Report, 1882.

NEW RUNNING SHED AT EVELEIGH

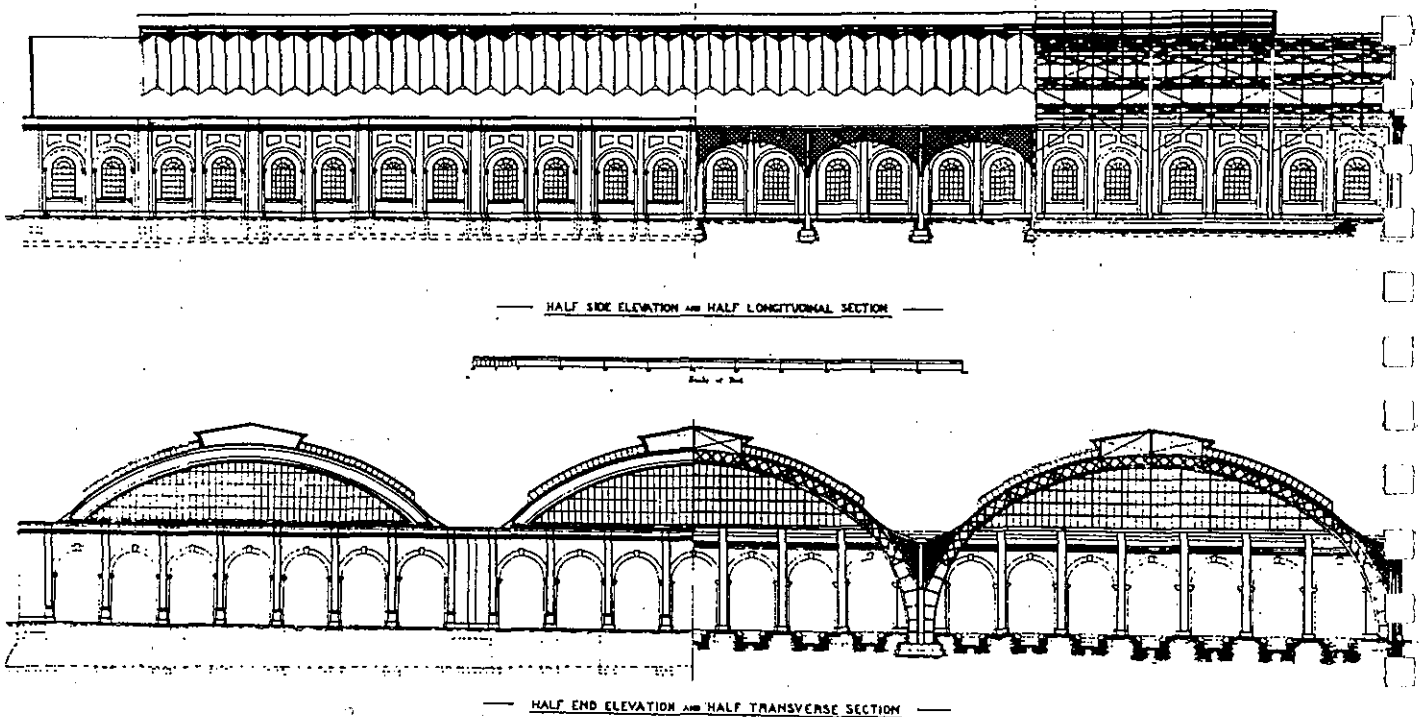


Fig. 2. New Running Shed at Eveleigh, 1884.

Most details of the structure of this building are shown in this diagram, including foundations, steel arch truss arrangement and roof design. The building was completed in 1885. (014)

Owing to the sandy nature of the soil in the vicinity and the need for absolute stability of the workshop walls (for the overhead crane supports) a great deal of work went into the design and construction of the foundations for the workshops. Long heavy piles were sunk deep into the ground in groups of three under each load-bearing pillar. Brick piers to ground level tied each group of piles together and each brick pier was braced to its adjacent piers by low brick arches. Load-bearing pillars were placed above

each pier, with the walls constructed above and along the brick arches between piers.

The construction of the workshops was scheduled in stages, with Bays 1-4 proceeding ahead of the rest of the workshops. The contract for the construction of Bays 1-4 was let to George Fishburn late in 1884 for a cost of 40,725 pounds and work commenced shortly afterwards.

N.S.W.R. Annual Report, 1885.

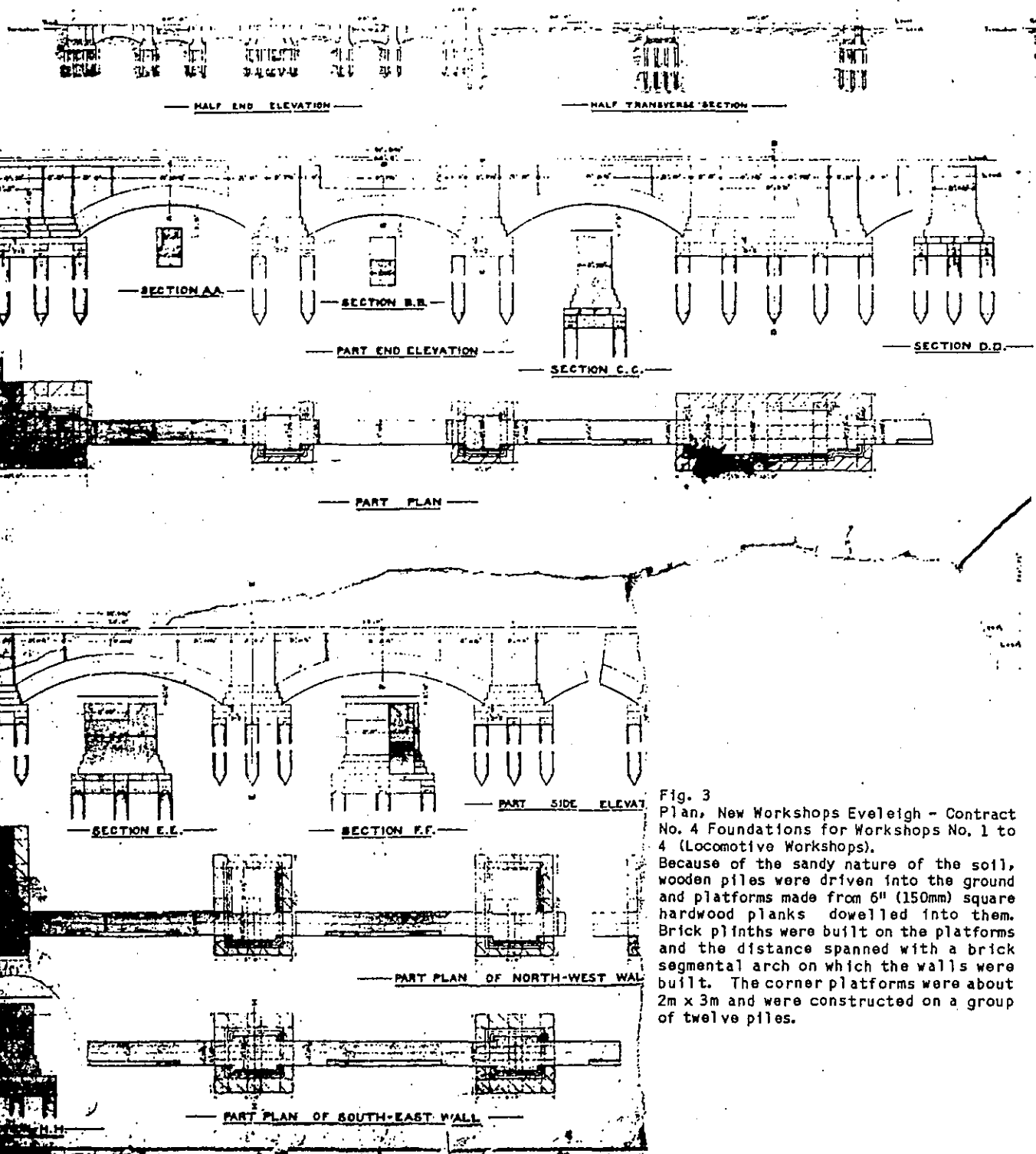


Fig. 3
 Plan, New Workshops Eveleigh - Contract No. 4 Foundations for Workshops No. 1 to 4 (Locomotive Workshops).
 Because of the sandy nature of the soil, wooden piles were driven into the ground and platforms made from 6" (150mm) square hardwood planks dowelled into them. Brick plinths were built on the platforms and the distance spanned with a brick segmental arch on which the walls were built. The corner platforms were about 2m x 3m and were constructed on a group of twelve piles.

CONTRACT N° 9

N. S. W. R.

DRAWING N° 2

NEW WORKSHOPS EVELEIGH

DETAILS OF FOUNDATIONS AND PITS SHOPS 16 TO 25

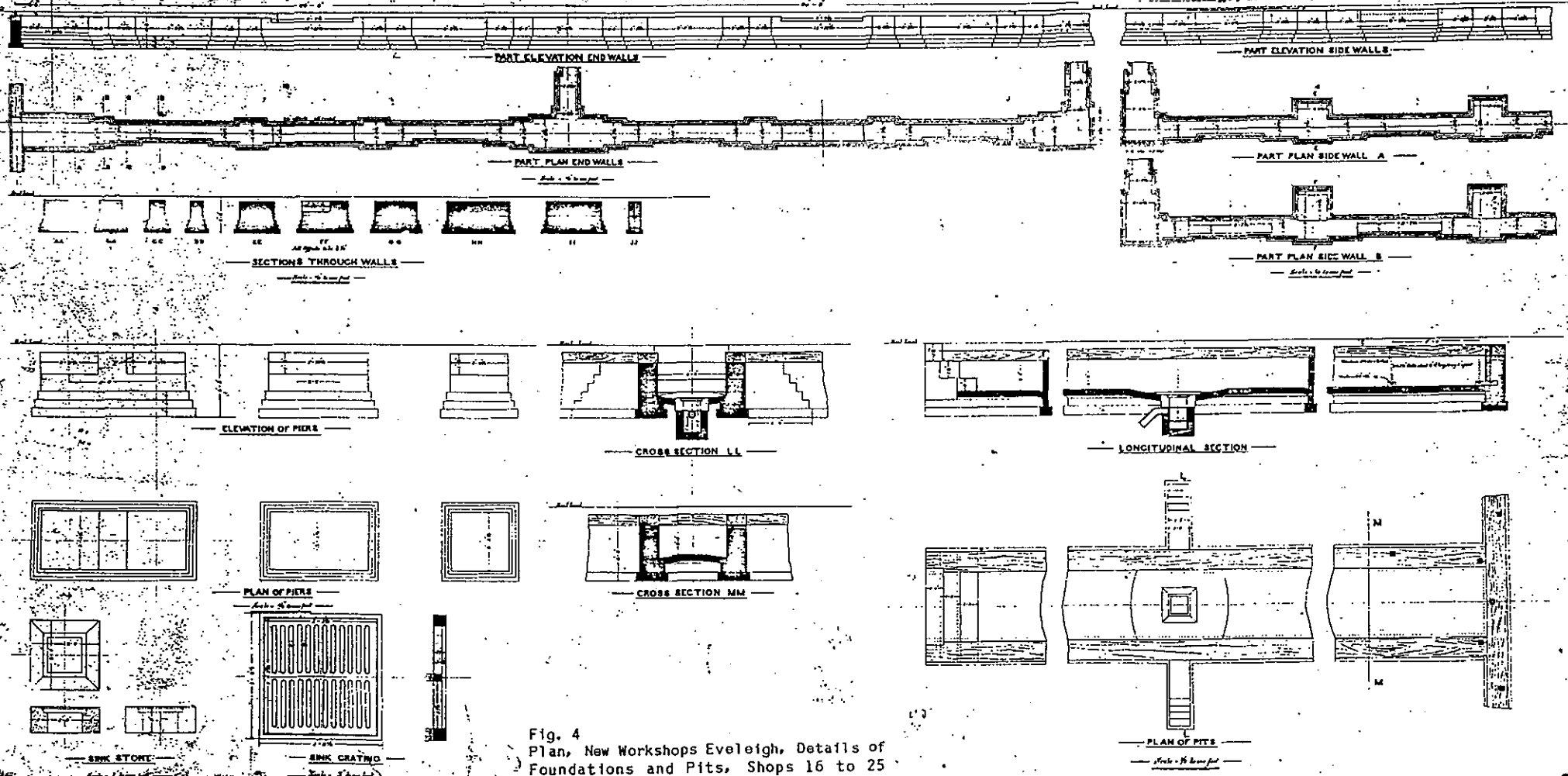


Fig. 4
 Plan, New Workshops Eveleigh, Details of
 Foundations and Pits, Shops 16 to 25
 (Carriage Workshops) Contract No. 9,
 1883.

Because the soil on the Carriage
 Workshops side of the site was better for
 building, the spectacular pile, platform
 and plinth method of constructing the
 footings was abandoned in favour of the
 more conventional type of footing.

By 1885, the construction of the workshops was in progress and the purchase of machinery had commenced. During this year, an office building for the Locomotive Operations Manager was constructed near the southern coal stage adjacent to the Running Shed with entrance gates and a watchman's office built nearby. A small brick building was erected on the southern side of the Running Shed and a self-contained steam-driven electric light plant installed. The foundations for the Bays 5-15 were also completed, enabling the contract for the construction of these bays to be let to John Ahern at a price of 80,837 pounds.

N.S.W.R. Annual Report, 1885.

By the end of 1885, the Running Shed was completed and put into operation, the final cost being 68,728 pounds. Located at the Macdonaldtown end of the site, it was a large brick and stone building, 300 ft long by 220 ft wide, containing three longitudinal bays each containing seven roads of track. Each bay was covered by a segmental-arched roof of corrugated iron capped with a central gabled monitor and containing rows of skylight panels on either side of the monitor.

Fig. 5. Engine Running Shed, Eveleigh. The elegant yet functional design of this building, the first of the Eveleigh complex to be completed, set a high standard which was reflected in other later constructions. Engines were garaged, cleaned and serviced in this building. (B25)



ENGINE RUNNING SHEDS, EVELEIGH

The segmental-arch gable-ends of each bay were also glazed. Roof support was provided by rivetted steel lattice beams curved to follow the arch line, braced longitudinally by lattice beams running the length of the bay at approximately ten degree intervals around the arch. This arrangement obviated the need for internal columns and allowed the maximum unobstructed headroom below the roof. Across the facade of each bay, seven arched openings accessed the seven roads, each arch having a projecting keystone and imposts. The floor was of concrete with brick paving between each road. Inspection pits were placed below each road and these ran the length of the building. Ash pits were installed below each road outside the eastern end of the shed.

Fig. 6. Inside the Engine Running Shed, Eveleigh.

Engines and tenders were parked in continuous lines on the twenty-one roads in the shed. Extensive areas of glazed panels in the roof and on the arched end walls gave good natural lighting in addition to the electric lights installed throughout. (B28)



The construction of the workshops continued throughout 1886. The Carriage and Wagon Shops were also being built at this time (the contract was let to Harold Norris in January 1885). With the tracks laid and sidings constructed the general layout of the site took shape. An unfortunate incident occurred late in this year when all of the existing timber patterns for iron-casting were destroyed as the building in which they were temporarily housed caught fire and burned down.

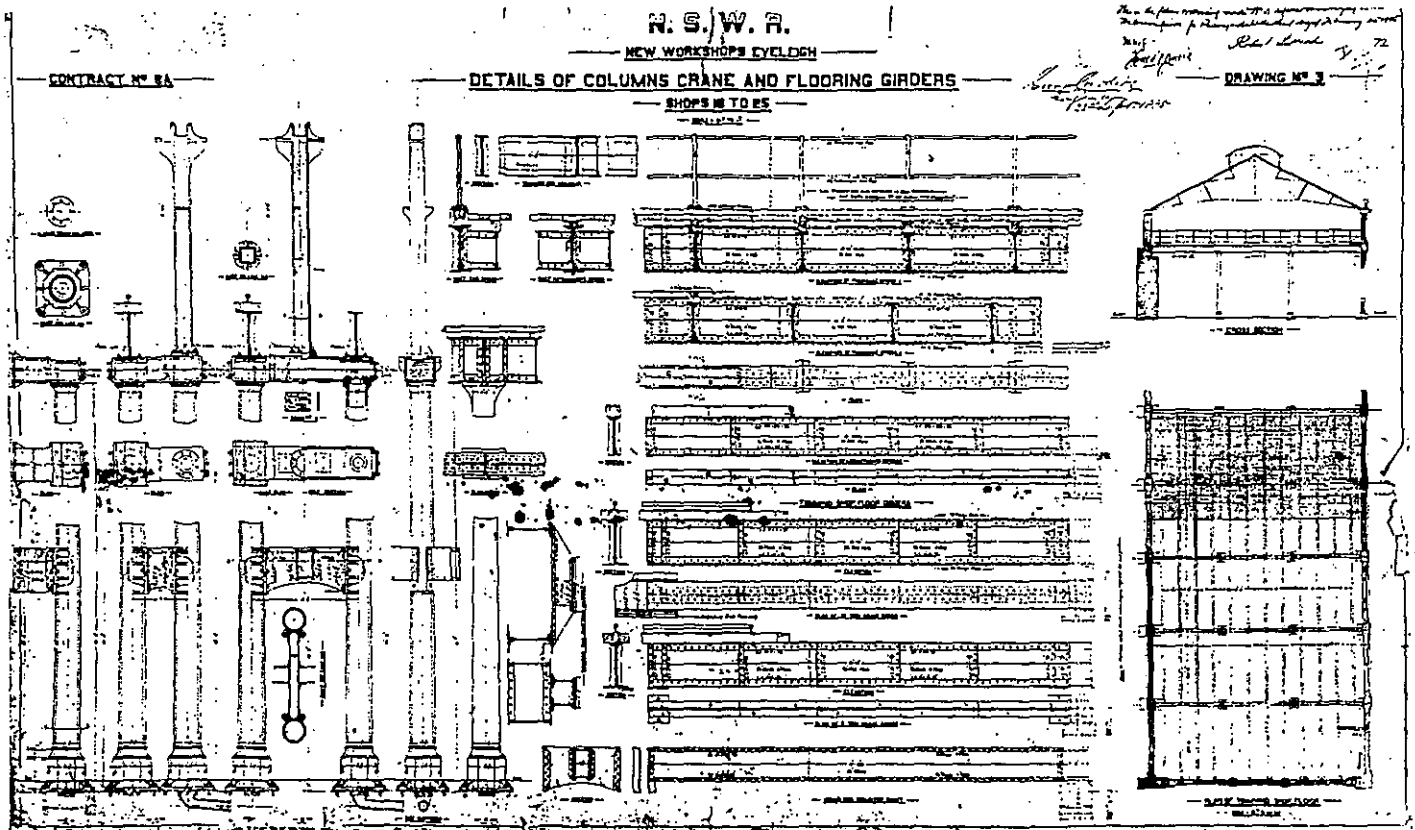
Early in 1887, workshops 1-4 were officially opened. The four shops were each 300 ft long and 60 ft wide, built as adjoining bays with no internal walls. Each bay was covered by a gabled roof clad in corrugated-iron with a central monitor and a row of skylight panels on either side of the monitor. Walls were of load-bearing brick laid in English bond with semi-circular window arches in white brick with sandstone sills and string courses. Ridge capping on the gable-ends was also of sandstone.

N.S.W.R. Papers 87/57.

Internally, the bays were separated by a double row of cast-iron columns (cast in the Globe Foundry of Glebe) running the length of the bays below the junction of each gable. The columns were hollow and acted as downpipes taking water from the roof to the sub-floor drains.

The roof was supported by light steel trusses carried on the walls or columns and the overhead cranes ran on plate girder beams carried on the intruding wall pilasters or the rows of columns.

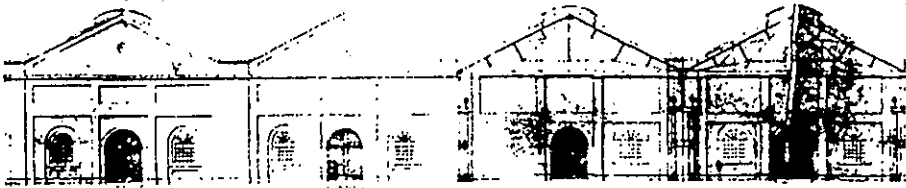
Fig. 7
Plan, New Workshops Eveleigh, Details of Columns, Crane and Flooring Girders, Shops 16 to 25 Contract No. 8A, 1885. The columns which held the roof trusses were cut in two lengths which were later bolted together. These columns carried rainwater from the roof box gutters to the sub-floor drains. The columns were generally in pairs. In one pattern, one column held the crane girder while the other supported the roof truss. In a second pattern both columns held crane girders while a higher separate centre section held the roof truss.



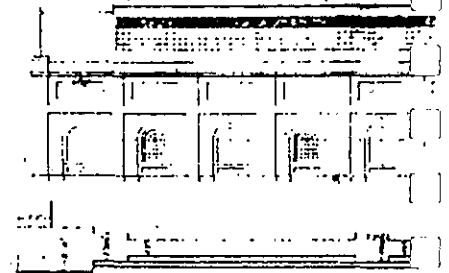
Contract 4B

NEW WORKSHOPS
DETAILS OF SUPERSTRUCTURE

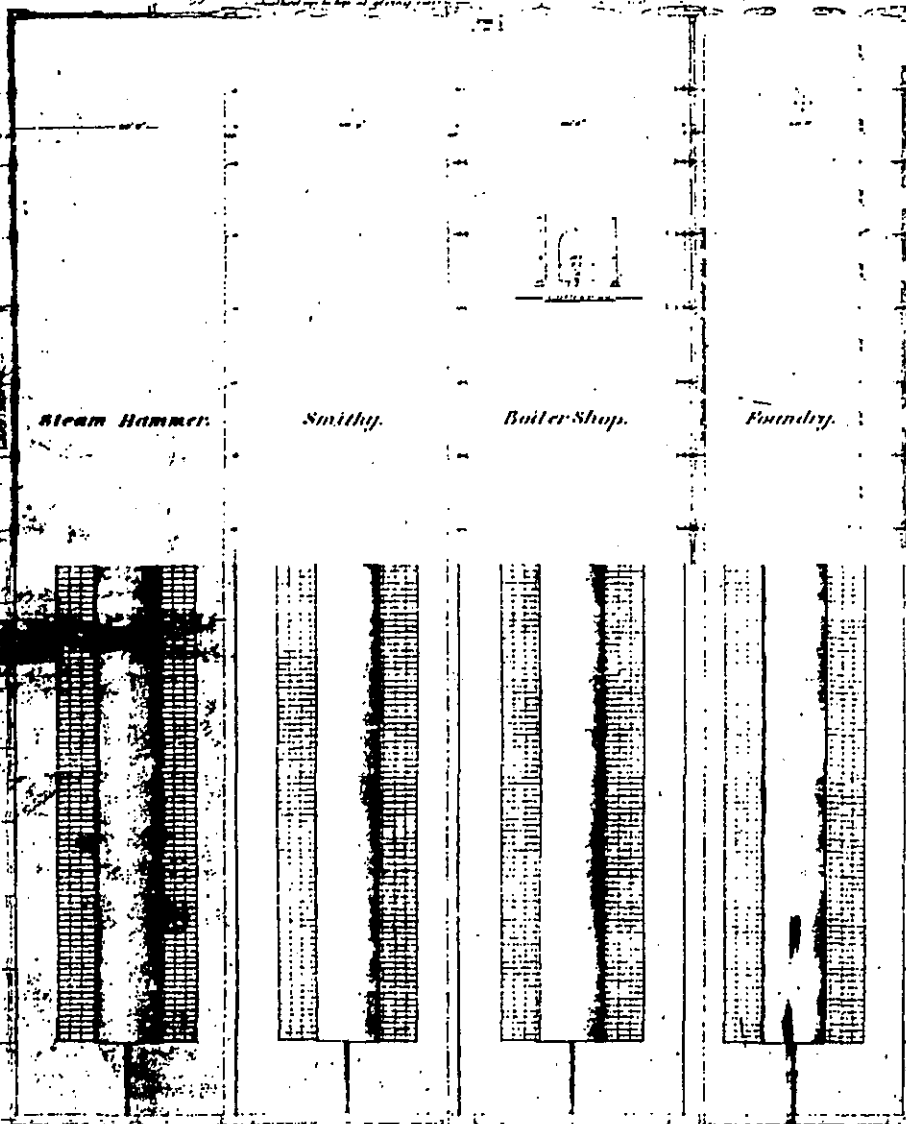
Scale 1/8" = 1'-0"
Details 4B



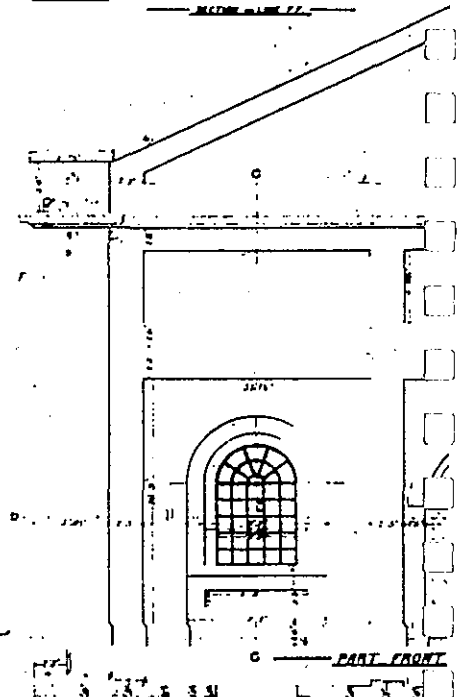
FRONT ELEVATION



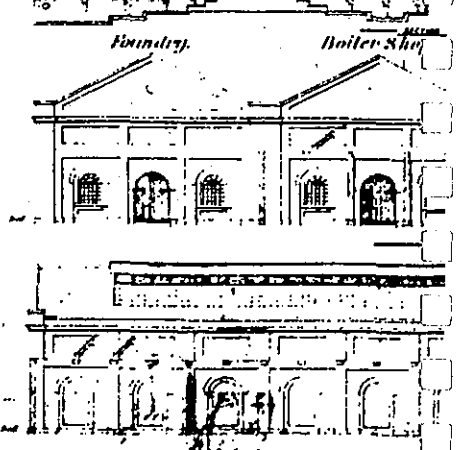
PART FRONT



GENERAL PLAN



PART FRONT



Foundry Boiler Shop

Fig. 8
Plan, NSW, New Workshops, Eveleigh,
Details of Superstructure, Shops 1 to 4,
Contract 4B, Sheet No. 1, 1884.
Bays 1 to 4 contained the 'dirty' trades
of foundrywork, boilermaking and
blacksmithing. They were originally
separated from bays 5 to 15 by a space
equivalent in width to one of the bays.

Workshops were numbered from the eastern end of the building, Bay 1 being the Steam Hammer Shop, Bay 2 the Blacksmith's Shop, Bay 3 the Boiler Shop and Bay 4 the Foundry. Annexes were built on the southern and western sides. At the rear (south) of Bay 1 was the case-hardening annexe. The boiler house annexe which contained four 'D' class boilers with space for two more straddled the rear of Bays 2 and 3 while the hydraulic engine house adjoined the rear of Bay 3. In the laneway, which then existed between Workshops 1-4 and 5-15, were located, on the northern side, the Tinsmiths and Coppermiths Shop and on the southern side the sand store and core stoves for the Foundry. These annexes though small were built of the same materials and with similar detailing to the main building.

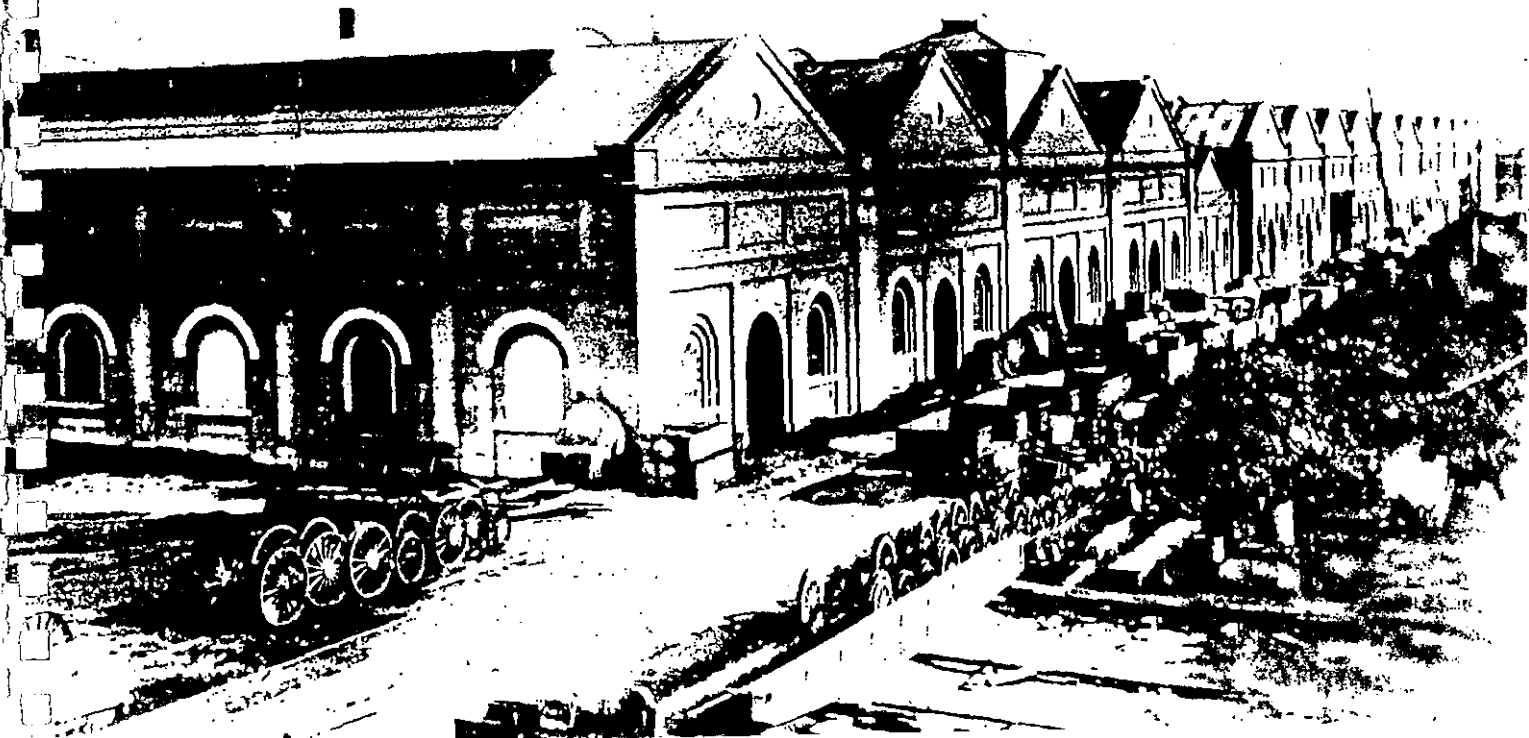
Illus. Syd. News, 18/7/91 p.11-13.

Later in 1887 the workshops 5-15 were also completed and opened. The building was structurally very similar to the first four workshops with each bay housed under a single gable and separated from the adjacent bays by a double row of iron columns, generally supporting overhead cranes traversing the length of the bay. The width of each bay was 50 ft, slightly narrower than in the original section but wall, window and roof details were almost identical. Bays 7 and 13 each contained a Craven 45 ton ground traverser for carrying engines in and out of the building and the northern and southern facades of these bays were enclosed below the gable by a pair of swinging iron doors with a heavy iron lintel above. Symmetrically placed as the third bay from either end, the variance in the facades of these bays was planned and executed as a feature of the final appearance of the complex.

N.S.W. Papers, 87/57.

Fig. 9. Railway Workshops in the early 1890's.

The fifteen bays of the Locomotive Workshops were built in two groups, one of four bays and one of eleven bays. The Coppermiths and Tinsmiths Shops were housed in a small annexe with matching architectural detailing in the laneway between the two groups. (C24)



The intended function of each workshop bay was part of the design of the building, with the relevant features necessary for the function included in the arrangements of the building. Bay 5 was the Tender Repair Shop and had a 25 ton overhead crane installed. Bays 6,7 and 8 contained the Engine Repair or Erecting Shop, with the Traverser in Bay 7 distributing locomotives to the bays on either side, each of these having a 25 ton overhead crane. Bay 9 contained the Wheel Shop and the Machine and Fitting Shop occupied Bays 10 and 11. Each of these bays had a 5 ton overhead crane installed. Bays 12 and 13 contained the Paint Shop with the Traverser in Bay 13 to move locomotives in and out. Brick walls inserted instead of columns at the junctions with either adjacent bay isolated the Paint Shop from the rest of the Workshops and, in the absence of any overhead crane, only a single row of columns divided the two bays. Bay 14 contained the Pattern and Joiners Shop and a brick wall also separated this from Bay 15 containing the Locomotive Store which supplied all manner of parts and tools used in the workshops. Two annexes were built at the rear of Bays 9 and 10, one being the Cleaning Shop and the other a second Boiler House.

Motive power in the shops was provided by wall-mounted steam engines driving lineshafts running along and secured to the tops of the iron columns.

Fig. 10. Railway Running Sheds, Eveleigh 1890's. The building housing the electric light plant with its twin boiler chimneys was erected on the south side of the Running Shed to provide light for overnight servicing of locomotives. The small brick building in the right foreground housed the sand-drying furnace - dry sand is still used on locomotives to assist traction in slippery or icy conditions. (B26)



CONTRACT N°5B

NSWR
NEW WORKSHOPS EVELEIGH
SUPERSTRUCTURE SHOPS 5 TO 15

DRAWING N°1

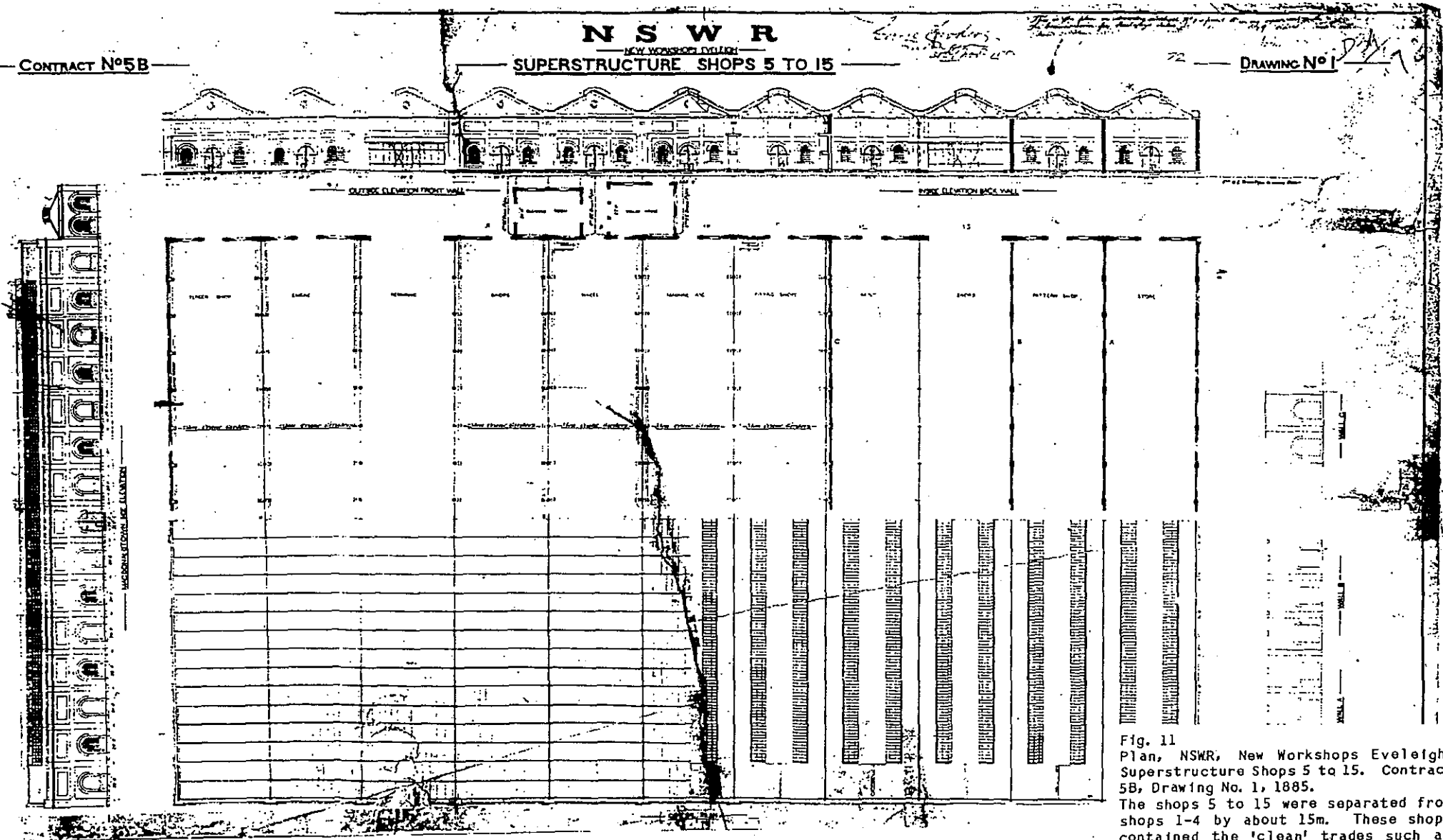


Fig. 11
Plan, NSW Rail, New Workshops Eveleigh,
Superstructure Shops 5 to 15. Contract
5B, Drawing No. 1, 1885.
The shops 5 to 15 were separated from
shops 1-4 by about 15m. These shops
contained the 'clean' trades such as
machining, patternmaking and painting.
The facades of the shops on the northern
elevation were identical, having two
windows and a door surmounted by semi-
circular arches, except for shops 7 and
13 which contained the traversers.

Pairs of these engines were located against the rear (south) wall in the Boiler Shop (Bay 3), the Erecting Shop (Bays 5, 6 and 8) and the Machine Shop (Bays 9, 10 and 11). The workshops were well lit by electric lights powered from the independent electric light plant near the Running Shed.

N.S.W.R. Budget, 21/7/00, p.239, 240.

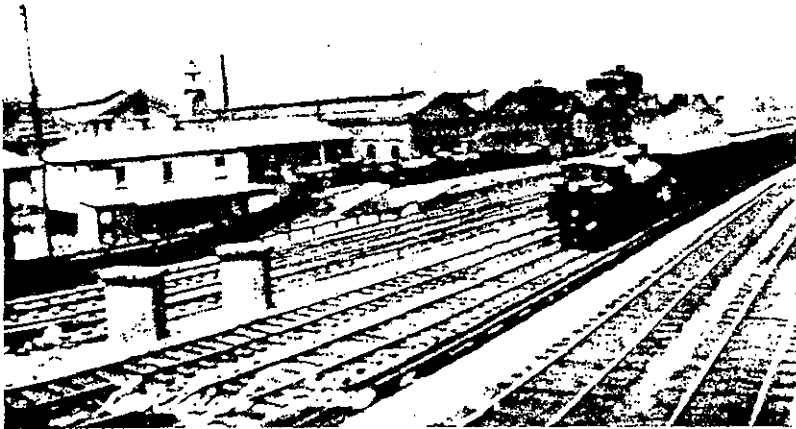


Fig. 12. Eveleigh Loco Works - approx. 1910.

The original configuration of the Locomotive Works Managers and Timekeepers office building, with the bell-tower on the westernmost side, was altered in 1922 with additional offices constructed on this side. (A1)

North-east of the workshops, a small building was erected to house the Timekeeper's and Works Manager's offices. Of cement-rendered brick, two storeys, with a hipped double-gabled roof of corrugated iron, it had a verandah encircling the ground floor and a square bell-tower on the western side. The bell tower was topped by an elaborate cast-iron bell cage. Verandah posts were cast-iron with iron lace decorations at the capitals.

Across the railway yard on the northern half of the site, the Carriage and Wagon Workshops also opened late in 1887. Built of the same materials

Fig. 13. Carriage and Wagon Workshops, Bays 16-25.

Built with similar detailing to the Locomotive Workshops, the Carriage and Wagon Workshops occupied ten bays. The eastern end of these workshops was allocated to Wagon construction and repair while the western end was allocated to Carriage construction and repair. (R26)



CONTRACT N° 9A

N. S. W. A.
NEW WORKSHOPS EVELEIGH
ROOFS COLUMNS AND CRANE GIRDERS SHOPS 16 TO 25

DRAWING N° 1

*Completed
18th Dec 1915*

*This is plan and drawing made by S. H. J. for the
General M. S. Buildings for the Government
that day of January 1915. R. L. Lusk*

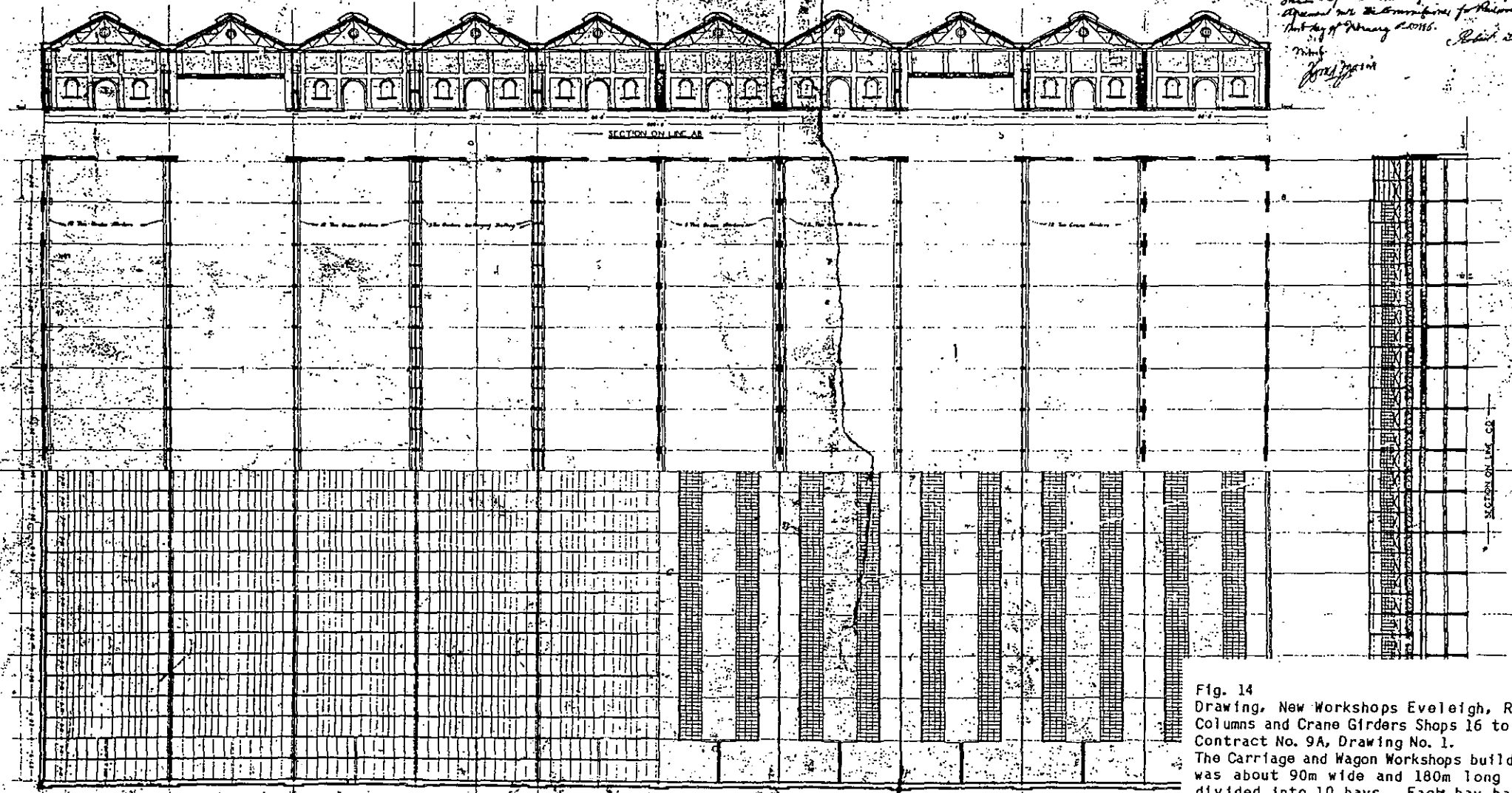


Fig. 14
 Drawing, New Workshops Eveleigh, Roof
 Columns and Crane Girders Shops 16 to 25.
 Contract No. 9A, Drawing No. 1.
 The Carriage and Wagon Workshops building
 was about 90m wide and 180m long and
 divided into 10 bays. Each bay had a
 door and two windows surmounted by semi-
 circular arches in its gabled end except
 for bays 17 and 23 which housed
 traversers that ran the length of the
 bays.

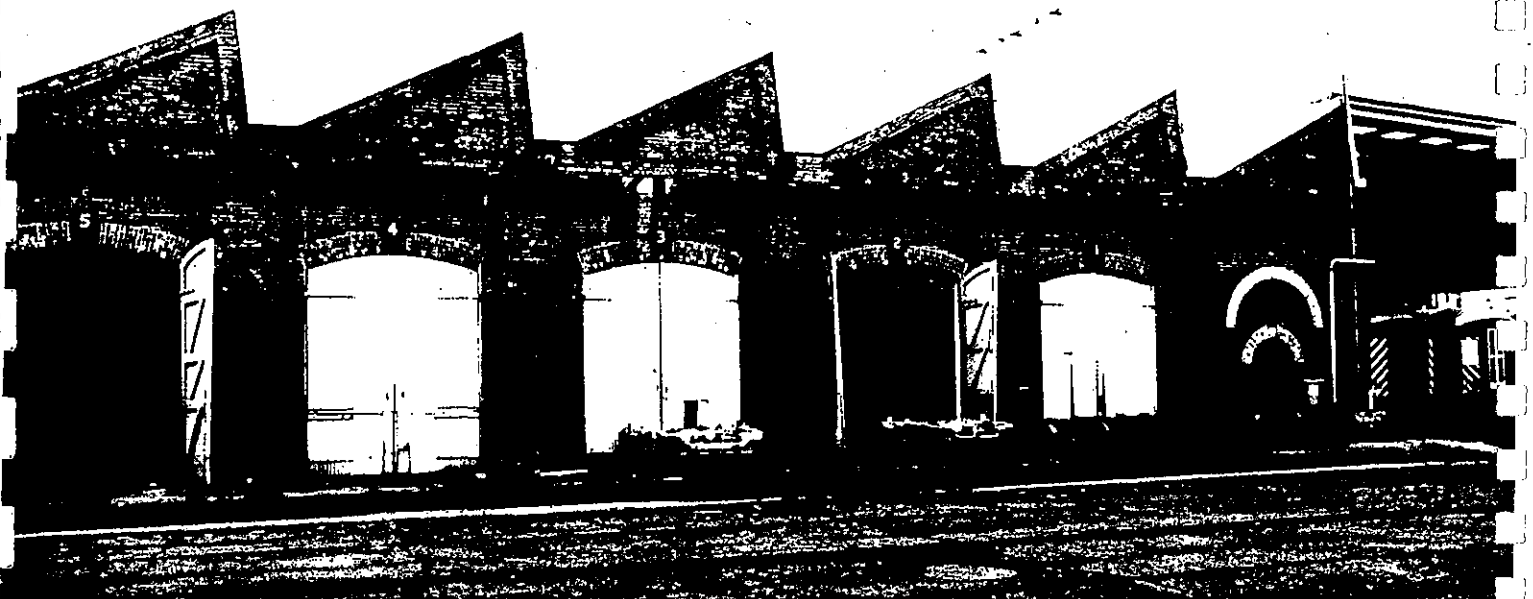
and to an almost identical design as the Locomotive Workshops, the building comprised ten bays, 300 ft long and 60 ft wide, numbered 16-25. These shops performed much the same general function as the Locomotive Workshops but acted exclusively on Carriages and Wagons and from the outset, new carriages and wagons were constructed at these workshops.

As in the Locomotive Workshops, bays and groups of bays were allocated to specific functions. Bays 16, 17 and 18 were the Wagon Repairing Shops with a Craven Ground-Traverser in Bay 17 and 12 ton overhead cranes installed in Bays 16 and 18. Bays 19 and 20 contained the Woodworking Machine Shop with a 5 ton crane in Bay 19. Bay 21 was isolated by brick walls on either side - the Fitting and Turning Shop occupied the southern three-quarters of the bay, with a small Blacksmith's Shop in the northern quarter. Bays 22, 23 and 24 were the Carriage Repairing Shop, with another Craven Ground-Traverser installed in Bay 23 and 12 ton cranes installed in Bays 22 and 24. Bay 25 contained a two-storey store section in its northern quarter while the rest contained the Trimming Shop.

On the eastern side of the Carriage Workshops was built a large Paint Shop for the painting of carriages. Built in brick with a saw-tooth roof, it measured 400 ft by 160 ft and contained 6 roads of track. A system of steam pipes constructed below the floor provided heating to assist in the paint drying.

N.S.W.R. Budget, 21/6/00, p.255. 256.

Fig. 15. Paint Shop
Built at the same time as the rest of the workshops, the Paint Shop featured a saw-tooth roof unlike all other buildings. This was to give maximum natural light to the interior. A system of steam pipes throughout the building provided temperature control to assist in paint drying. (R27)



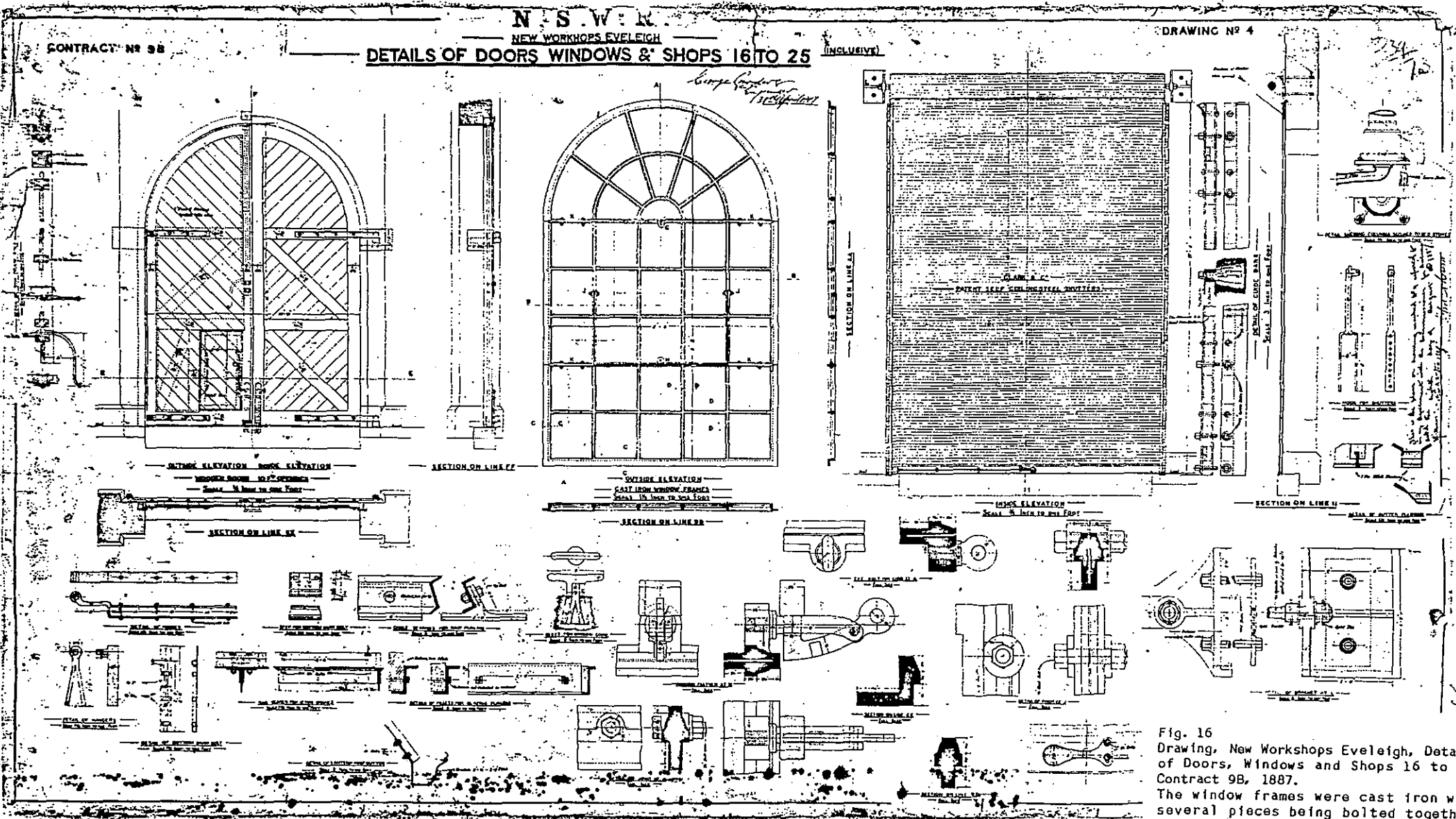


Fig. 16
Drawing, New Workshops Eveleigh, Details of Doors, Windows and Shops 16 to 25, Contract 9B, 1887.
The window frames were cast iron with several pieces being bolted together. The side doors, like the windows, had semi-circular tops and quite exquisitely crafted wrought iron handles, clasps, barrel bolts and hinges. The end doors were of the patent self coiling shutter type by Clarke and Co. and must have been amongst the earliest of their kind used in Australia.

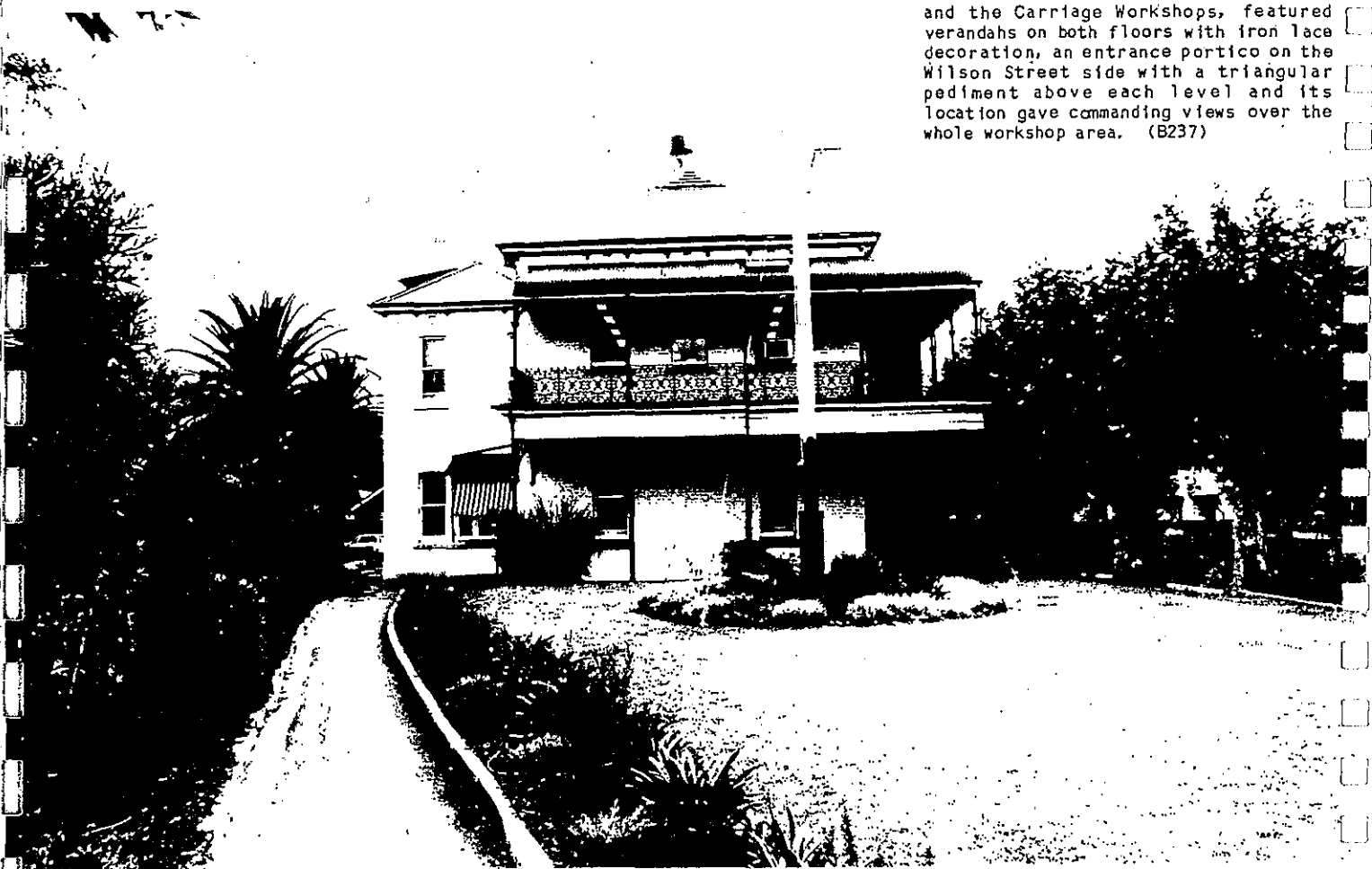
On the ridge above the workshops adjacent to Wilson Street, a large two storey brick building was erected to house the offices of the Chief Mechanical Engineer, under whose supervision the whole workshops operated. Surrounded by a bull-nosed verandah on three sides supported by cast-iron columns with iron lace friezes for the capital brackets and iron lace balustrades it had a hipped single gable corrugated iron roof, sandstone window sills and an entrance portico to Wilson Street surmounted by a triangular pediment inscribed with the date '1887'. The 'Calder House' nearby was used as a residence.

All the workshops began operations almost as soon as they were completed, such was the backlog of work created by the inadequacy of the old workshops and the demand created by the constantly expanding rail system. Approximately 1500 men were employed in the Workshops, under the Chief Mechanical Engineer, Mr. W. Thow. Works Manager of the Locomotive side was Mr. H.B. Howe and of the Carriage Side was Mr. Elston.

Illus. Syd. New, 18/7/91 p.11.

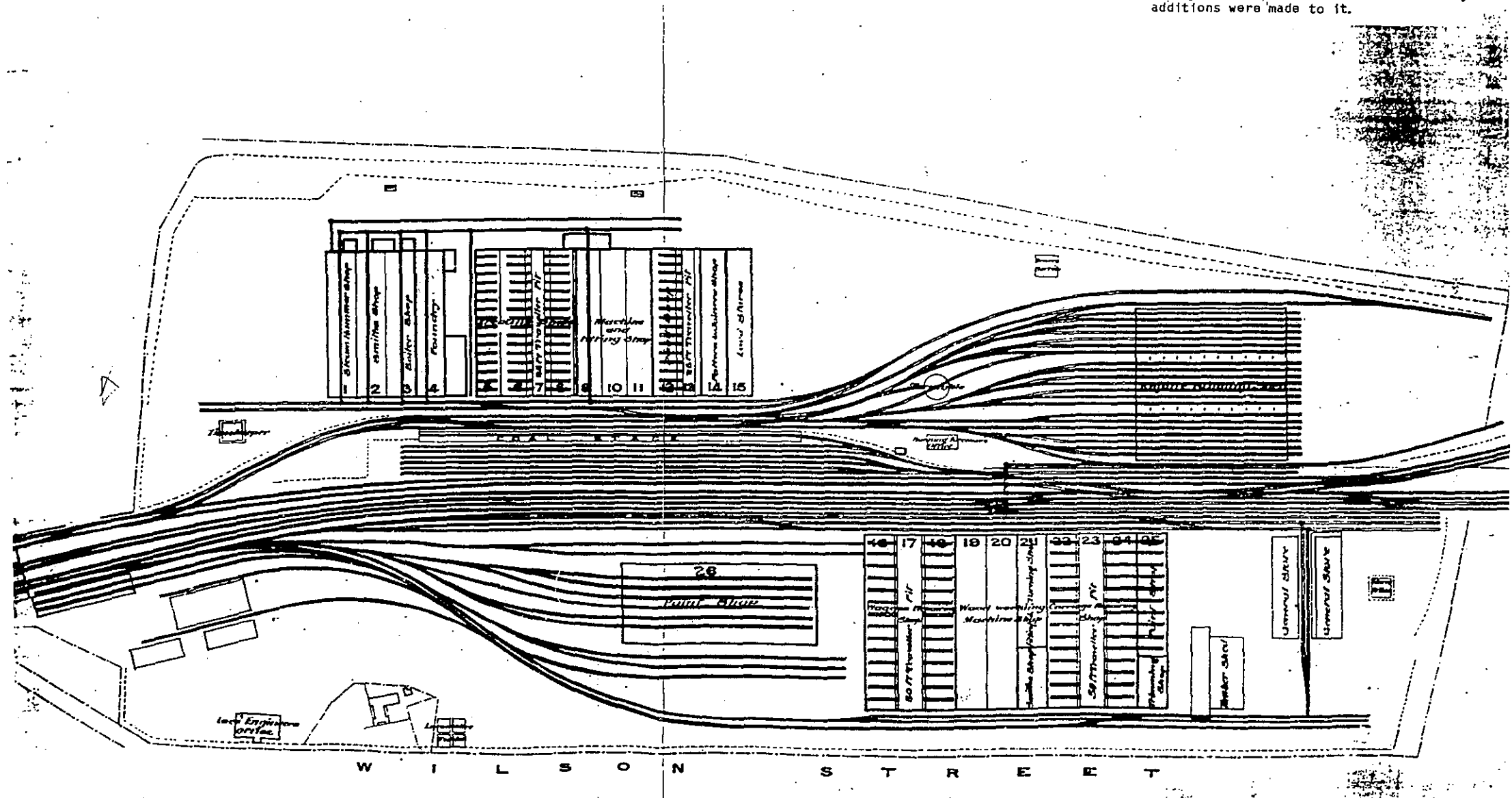
Fig. 17. Chief Mechanical Engineers Office.

This building, erected in 1887 as the control centre for both the Locomotive and the Carriage Workshops, featured verandahs on both floors with iron lace decoration, an entrance portico on the Wilson Street side with a triangular pediment above each level and its location gave commanding views over the whole workshop area. (B237)



N. S. W. R.
DIAGRAM OF WORKSHOPS
EVELEIGH

Fig. 18
 Plan, NSW Diagram of Workshops Eveleigh, 1887.
 The workshops are basically complete, Calder House is shown next to the building marked Locomotive Engineer's Office and the Timekeepers Office (which later became the Locomotive Works Manager's Office) is shown before any additions were made to it.



**EVELEIGH RAILWAY WORKSHOPS
HISTORY AND DEVELOPMENT
1888-1910 - CONSOLIDATION AND GROWTH**

Following the opening of the Workshops in 1887, the N.S.W. rail system underwent a period of sustained growth both in the construction of new lines and the amount of traffic handled. Although other workshops were established in other locations, Eveleigh was the central repair facility for the N.S.W. system throughout this period.



Fig. 19. Loco Workshops - Wheel Shop, Bay 9 - circa 1896. This array of belt-driven lathes and drills powered from the overhead lineshafts was used for machining and balancing all the wheels and axles used on locomotives. (All)

A few major additions appear to have been made to the workshops following its opening. In 1890, a carriage shed was constructed in the south-western corner of the site, adjacent to the Macdonaldtown Station. Constructed of timber clad in corrugated-iron and measuring 167 ft by 482 ft, the shed contained twelve roads of track for the stabling of carriages used in the suburban and interurban passenger services. In September of 1890 the erection of a timber drying shed was commenced on the Carriage Side of the Workshops for the storage and seasoning of timber used in Carriage construction and repair, as well as more general purposes. This was completed in March the next year by M. Scouter for 3,000 pounds. In

N.S.W.R. Shop Order 19/5/90.

N.S.W.R. Shop Order 1581/252.

Fig. 20. Loco Workshops - Wheel Shop, Bay 9 - circa 1896. Similar to the previous figure, the wall-mounted steam engine driving the lineshaft can be seen to the left of the central doorway. Internal lighting at this time was predominantly through overhead skylights. (A12)

1891, a new coal stage was constructed using materials salvaged from the demolition of other earlier coal stages on the site. A special workshop was established in that year for the manufacture, maintenance and repair of Signals and Telegraphs in the northern part of the site. In the western corner of the site, construction of a gas-producing plant was commenced in November by J. Cook and Co. (for a cost of 13,215 pounds) to replace a small plant established during the construction of the Workshops.

N.S.W.R. Shop Order 1590/252.

N.S.W.R. Shop Order 2265/252.

N.S.W.R. Shop Order 2720/253.

Construction also commenced on a steam-powered laundry to be housed in a corrugated-iron shed on the southern side of the workshops. Equipped with revolving washing machines, hydro-extractors, boiling tanks and drying ovens powered from its own boilers and engines, the laundry washed the waste and sponge cloths used for cleaning all over the N.S.W. rail system.

N.S.W.R. Shop Order 2357/252.

N.S.W.R. Budget, 21/7/00, p.239-240.

A contemporary description from 18th July, 1891 edition of the Illustrated Sydney News describes the works in detail and claims that in size, scope and in the technology employed, Eveleigh Workshops at this time had no equal either in Australia or the southern hemisphere. It also notes that much of the iron supplied to the foundry and the Smiths Shop originated from the Eskbank Ironworks at

Existing Water Supply Shown Thus Y Symbols 2000
 Proposed do do do do
 S.Y. Bendon Stop Valve.
 F.P. do Fire Plug
 Hy. do Hydrant.
 Scale 66 feet-1 inch

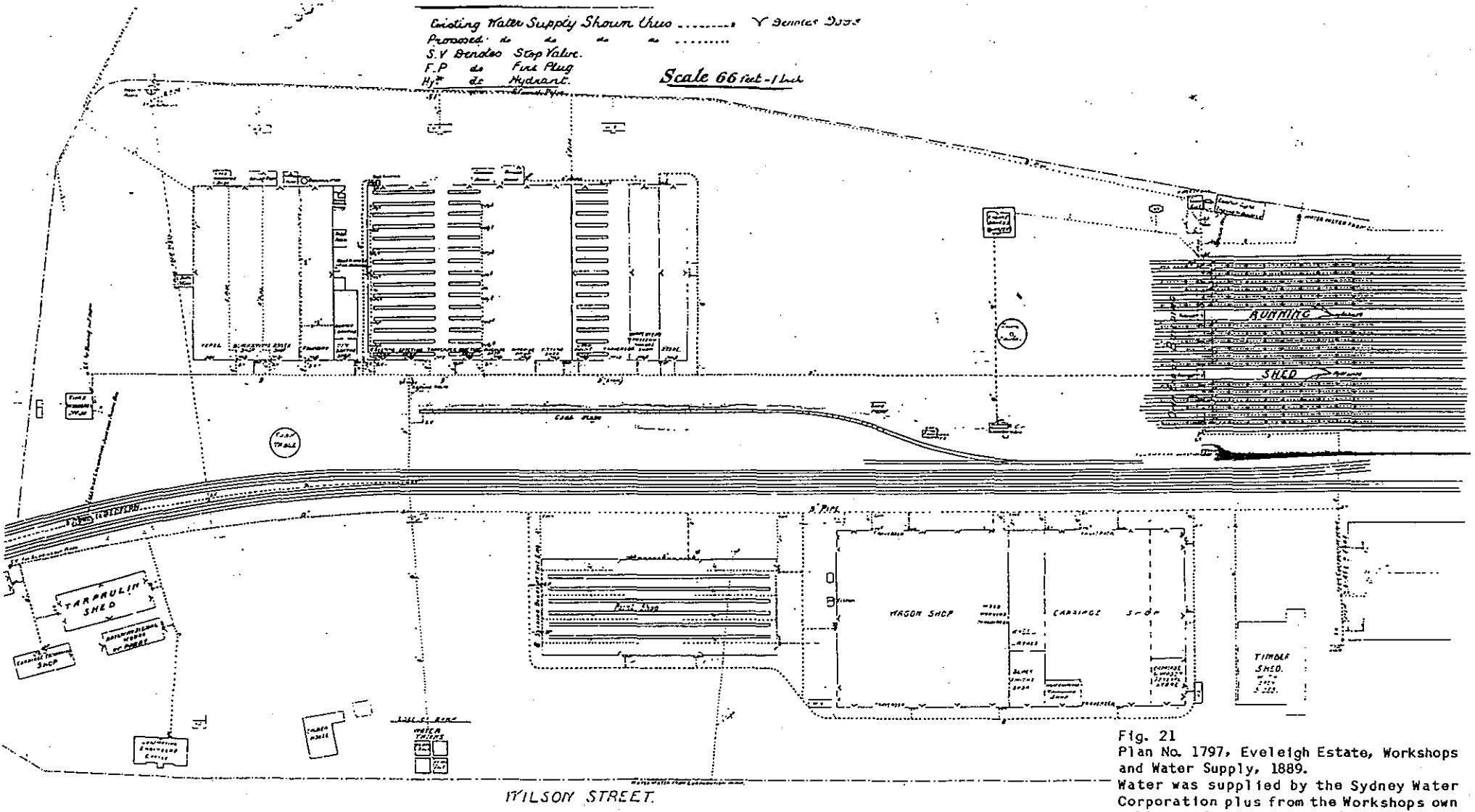
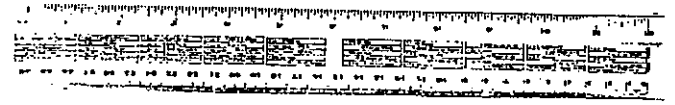


Fig. 21
 Plan No. 1797, Eveleigh Estate, Workshops
 and Water Supply, 1889.
 Water was supplied by the Sydney Water
 Corporation plus from the Workshops own
 well located in the SE corner of the
 works. Calder House can be seen close to
 the NE corner adjacent the locomotive
 engineer's office which later became the
 General Manager's office. The electric
 light plant is in the SW corner close to
 the running sheds. Even by 1889 the
 works had become a very large industrial
 complex with some scope for expansion.



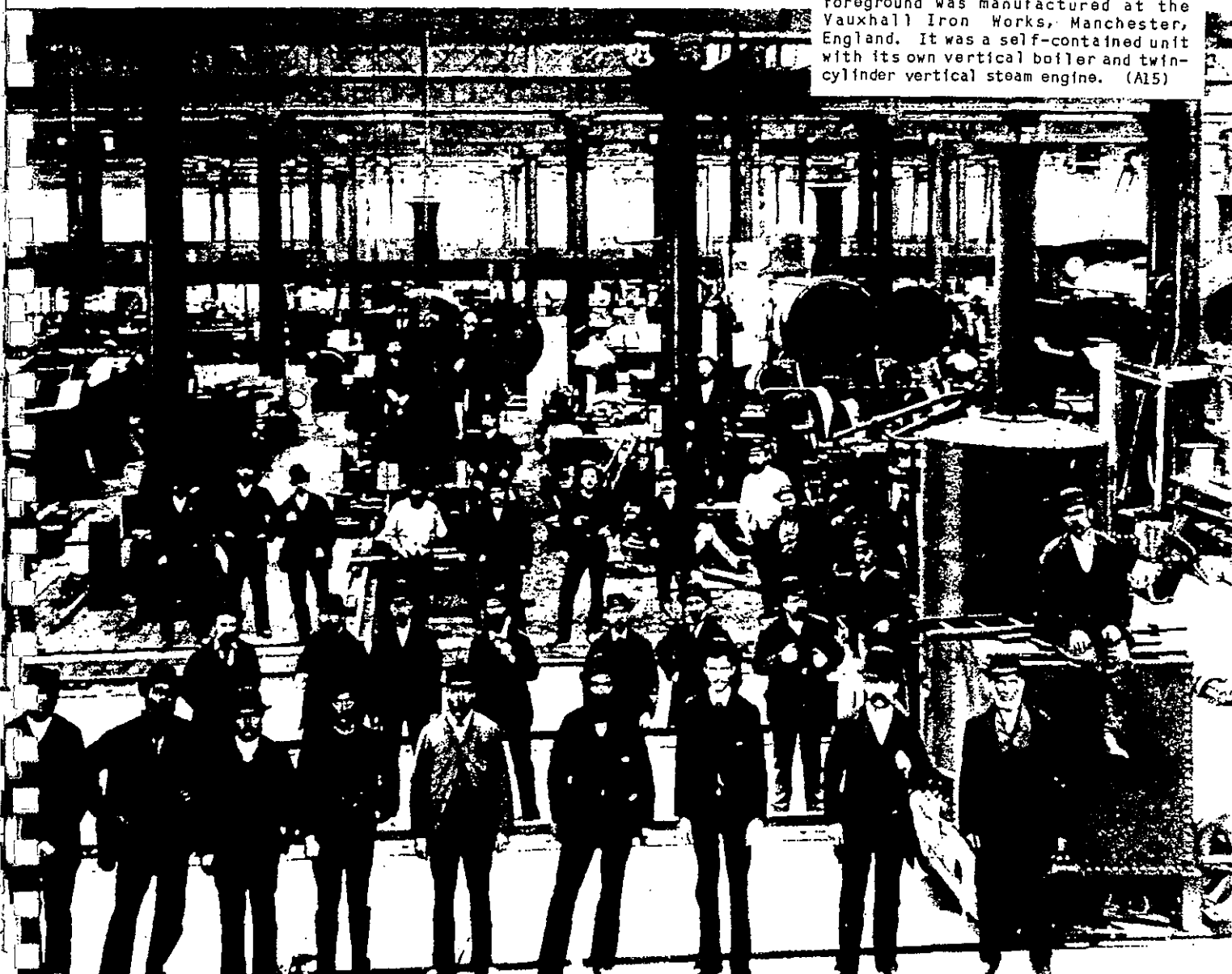
Lithgow - at this time an infant industry that was later to give rise to the present Port Kembla steelworks. This article is included as an appendix.

In 1892, union negotiations led to the workshops being closed on Saturdays - this was part of the social change underway at this time that eventually created the two-day weekend that remains a feature of Australian working conditions.

McLachlan, N.S.W.R. Sec. Office 19/3/92.

Fig. 22. Loco Workshops, Erecting Shop, Bay 7.

The Craven Bros. Steam Traverser in the foreground was manufactured at the Vauxhall Iron Works, Manchester, England. It was a self-contained unit with its own vertical boiler and twin-cylinder vertical steam engine. (A15)



In 1894 the electric light plant was completely upgraded. A Westinghouse boiler provided steam for a Tange engine and a No. 1 Westinghouse engine. Electricity was generated by a Westinghouse No. 5 generator.

N.S.W.R. Annual Report, 1894.

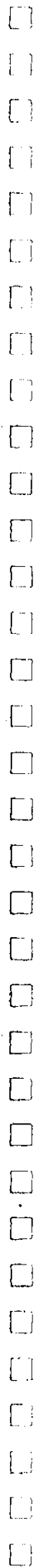




Fig. 23. Loco Workshops, Erecting Shop, Bay 6 or Bay 8.

The Craven Bros. overhead traversing crane was also manufactured in England. Of twenty-five tons capacity, it was powered by a continuous rope running the length of the crane track, driven by the wall-mounted steam engine. (A10)

In 1896, lightning rods were fitted to the 120 ft high chimney for the Boiler House behind Bay 2/3 and the old gas plant was removed, the new plant having been completed and put in operation.

N.S.W.R. Budget, 1896, p.99.

In 1898, the first major expansion of workshop facilities occurred with the construction of the new Erecting Shop, which soon became known as the Large Erecting Shop to differentiate it from the Erecting Shop occupying Bays 6-8 in the main workshop building. Built to increase the accommodation for the repair of locomotives, it

N.S.W.R. Shop Order 24/12/96.

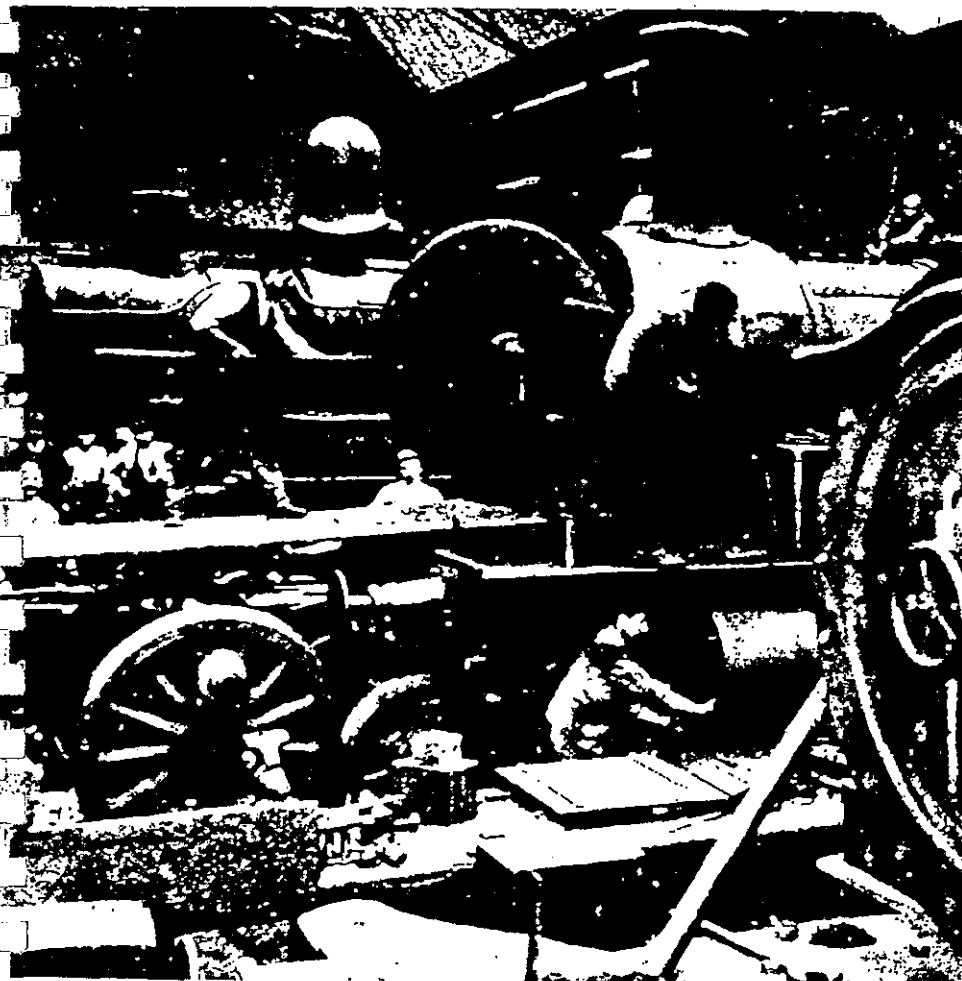


Fig. 24. Loco Workshops, Erecting Shop. All forms of locomotive repair and refurbishing was carried on in the workshops at Eveleigh. Engines were dismantled in the Erecting Shop, the various parts sent to other shops for repair or replacement, after which they returned to the Erecting Shop for the engine to be rebuilt. (9A)

was situated on the western side of Bay 15 and was a substantial building of two bays, each 400 ft long and 55.5 ft wide. Each bay contained three roads of track, the centre one being the clear road and those on each side used for engines undergoing repair. The roads had pits below running the length of the building for access beneath the engines and each bay had two 35 ton overhead cranes. Machines such as lathes, shaping, drilling, milling and grinding tools were installed and powered from a lineshaft running the length of the building between the two bays, driven by electric motors. The building was completed in June, 1899.

N.S.W. Railway and Tramway Magazine, 12/17, p.37.

N. S.W.R. Budget, 21/7/00 p.239-240.

N. S.W.R. Shop Order 28/6/99.

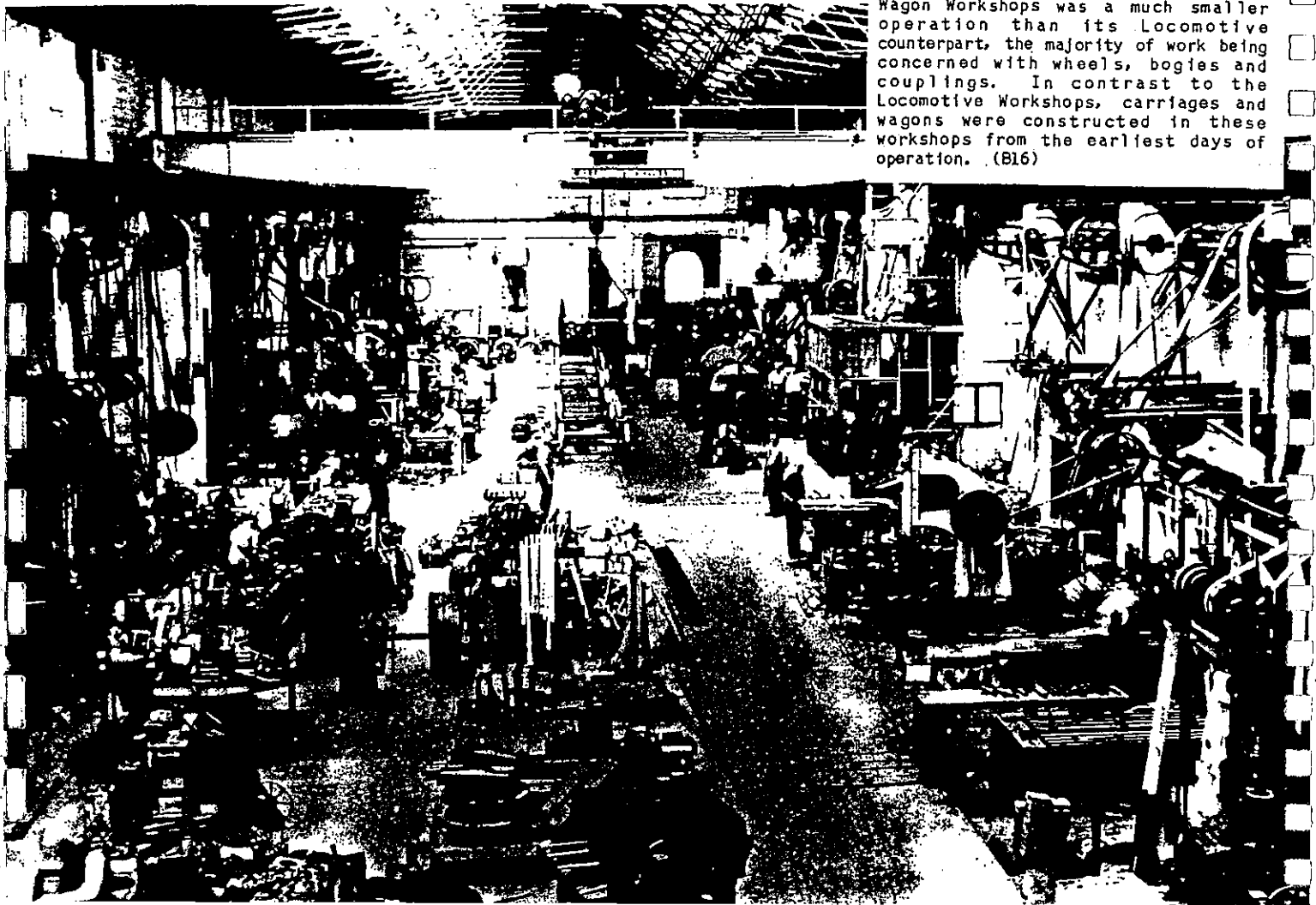
Concurrently, a new Foundry building was being erected adjacent to the Large Erecting Shop site. Established largely to allow the Boiler Shop to expand in Bay 4 of the main workshops, this building, 300 ft long and 60 ft wide, contained 3 iron-smelting cupolas and 12 brass cupolas, 2 core ovens, a steam moulding machine, a sand mixer, a Chilean Mill, rumblers and emery wheels. Lifting appliances included a 16 ton overhead travelling crane, two hydraulic jib cranes, one of 5 tons and one of 2 tons capacity. Several hydraulic lifts were installed outside the building for lifting scrap iron. This building was completed in March, 1899.

N. S.W.R. Shop Order 2/3/99.

N. S.W.R. Budget 21/7/00, p.239-240.

Fig. 25. Carriage Workshops, Machine Shop, Bay 21.

The Machine Shop of the Carriage and Wagon Workshops was a much smaller operation than its Locomotive counterpart, the majority of work being concerned with wheels, bogies and couplings. In contrast to the Locomotive Workshops, carriages and wagons were constructed in these workshops from the earliest days of operation. (B16)



Following the establishment of the Large Erecting Shop enabling many of the engine repair functions to be removed from the main building, the Paint Shop became immediately redundant and work commenced on converting Bays 12 and 13 for an Interlocking Shop. This work began in November 1899 with the removal of the brick wall between Bays 11 and 12 and the installation of iron columns and crane girders.

N.S.W.R. Budget 21/7/00, p.239-240.

N.S.W.R. Shop Order 23/11/99.

In 1900, owing to the large amount of locomotive repair work in hand and the expected growth in this area, an extension to the Large Erecting Shop was commenced. This extension was of 200 ft on the western end, bringing the total length of the building to 600 ft. Two additional cranes were installed, one in each bay and a lineshaft was erected in the extension powered by a 20 hp electric motor. It appears that this extension proceeded gradually as the work was not completed till 1906.

N.S.W. Railway and Tramway Magazine, 12/17, p.37.

Fig. 26. Loco Workshops, Large Erecting Shop. Constructed in 1899 and extended progressively until 1906, the Large Erecting Shop was the centre of the locomotive repair operations at Eveleigh. With each bay measuring 600 feet in length, it was the largest of the workshops entirely concerned with a single function. (X6)



In a separate development, a compressed-air plant was installed in an annexe to the Boiler Shop (Bays 3 and 4) and air-mains were installed around the workshops. The compressor was an Ingersoll-Sergeant with a capacity of 950 cubic feet per minute of free air compressed to 100 pounds per square inch. Various pneumatic tools were introduced and air-hoists were installed in the Machine Shop (Bays 9-11).

Fewtall, F., Works Manager, 14/5/55.

N.S.W.R. Budget, 21/7/00, p.239/240.

The year 1900 also provided an excellent and comprehensive description of both the Locomotive Workshops and the Carriage and Wagon Workshops in the monthly journal known as the N.S.W. Railway Budget. The Locomotive Workshops were detailed in the July 21 issue and the Carriage and Wagon Shops in the following issue of August 21. Both of these articles are included as an appendix.

By the end of 1901, work on the conversion of Bays 12 and 13 was near completion. The Ground-Traverser from No. 13 Bay was dismantled, removed and re-erected outside No. 15 Bay between it and the Large Erecting Shop. The rails in No. 13 Bay were removed, the pits filled-in and a crane installed in No. 12 Bay. 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.

Two new structures were commenced at the end of 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 being demolished shortly afterward. A large building of corrugated-iron was erected on the eastern end of the workshops (outside Bay 1) which contained in its northern half a Spring Shop and in its southern half a Steam Hammer Shop.

N.S.W.R. Shop Order 17/1/01.

N.S.W.R. Shop Order 14/2/01.

N.S.W.R. Shop Order 5/9/01.

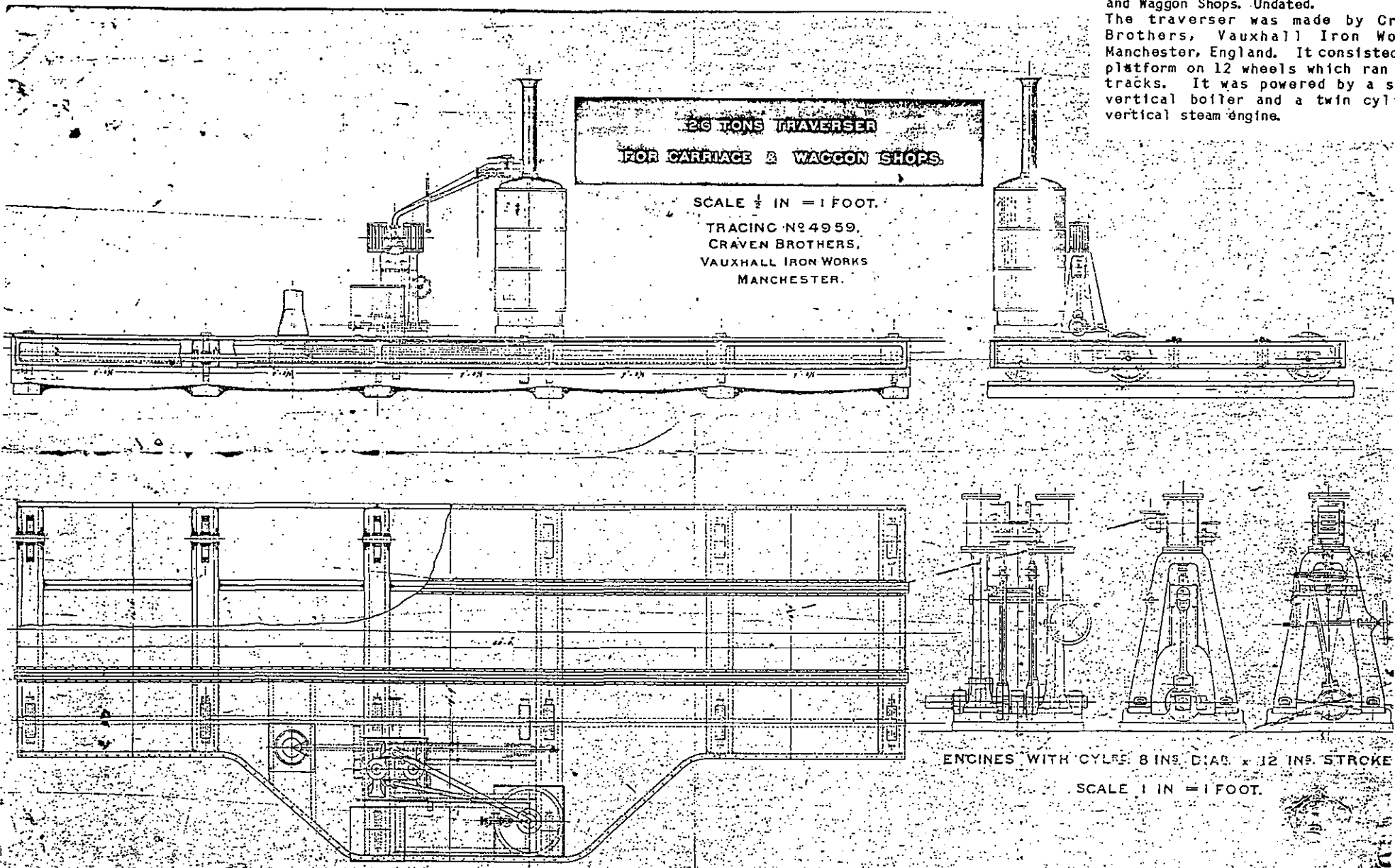
N.S.W.R. Shop Order 1/12/02.

N.S.W.R. Shop Order 1/12/02.

Fig. 27. Loco Workshops, Bays 3-15. In 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 reason for the construction of the twin square towers, apart from ventilation, doesn't seem to have been recorded. (C12)



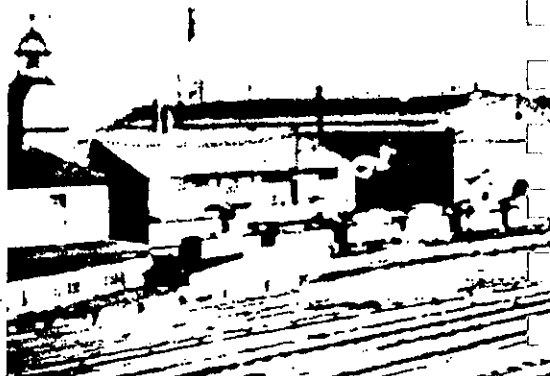
Fig. 28
 Drawing, 26 tons traverser for Carriage
 and Waggon Shops. Undated.
 The traverser was made by Craven
 Brothers, Vauxhall Iron Works,
 Manchester, England. It consisted of a
 platform on 12 wheels which ran on 6
 tracks. It was powered by a small
 vertical boiler and a twin cylinder
 vertical steam engine.



The reason for these two construction was the need to expand the operations of both the Blacksmiths Shop (Bay 2) and the Boiler Shop (Bays 3 and 4). During 1903, the laneway between Bays 4 and 5 was cleared of standing structures, infilled and roofed to match the adjoining workshops and the wall adjoining Bay 4 was removed and replaced by iron columns. The Boiler Shop then expanded into this bay. The Blacksmith Shop expanded into Bay 1 following the removal of the Steam Hammers and the Spring Section to their new location. These works were largely completed by 1905.

The Spring Shop was responsible for the manufacture of all sorts of springs including spiral, volute, lock and laminated springs that were used on the railways. The Steam Hammer Shop was initially an open-sided shed containing several steam hammers with associated furnaces, boilers and cranes for the manufacture of items once worked up on a blacksmith's anvil.

Fig. 29. Loco Workshops, Spring Shop. The Spring Shop was established in 1902 in a corrugated-iron shed on the eastern side of the Workshops. All types of springs used on the railway system were manufactured in this shop. (C11)



Fewtell, F., Works Manager, 14/5/55.

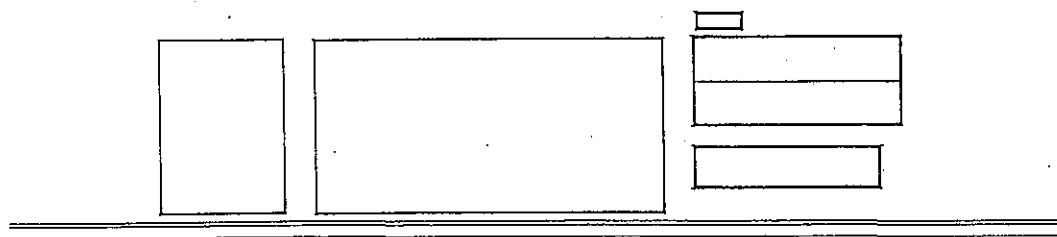


Fig. 30 Loco Workshops : Site Plan - 1900 The Large Erecting Shop, new Foundry and the Laundry have been constructed.

Although the exact date is unclear, it appears that the Wheel Press Shop was also established at this time adjacent to the new Tinsmiths Shop. Housed in a corrugated-iron, timber framed shed to the south of Bays 10-12, this shop contained hydraulic presses for removing axle centres, a tyre-heating plant, hydraulic cranes and a chain-testing machine.

Inst. of Eng. Syd. Div. 11/10/22.

Early in 1905, the arched roof over the three bays of the Running Shed was rebuilt. The lantern was lengthened and fitted with louvres, replacing the original ridge and furrow design.

Wylie, 1963, in A.R.H.S. Bulletin 291-314, p.945.

In August 1905, an engine weighbridge was installed in the yard a little to the north of the Large Erecting Shop.

N.S.W.R. Shop Order, 21/9/05.

During 1906, the Ground Traverser between No. 15 Bay and the Large Erecting Shop was converted from steam to electric power. This traverser was extended in 1907 on its southern side. Other developments included the installation of extra turntables in the Large Erecting Shop and the purchase of a 20 hp electric motor for the Spring Shop.

Fewtell, F., Works Manager, 14/5/55.

N.S.W.R. Shop Order 6149/255.

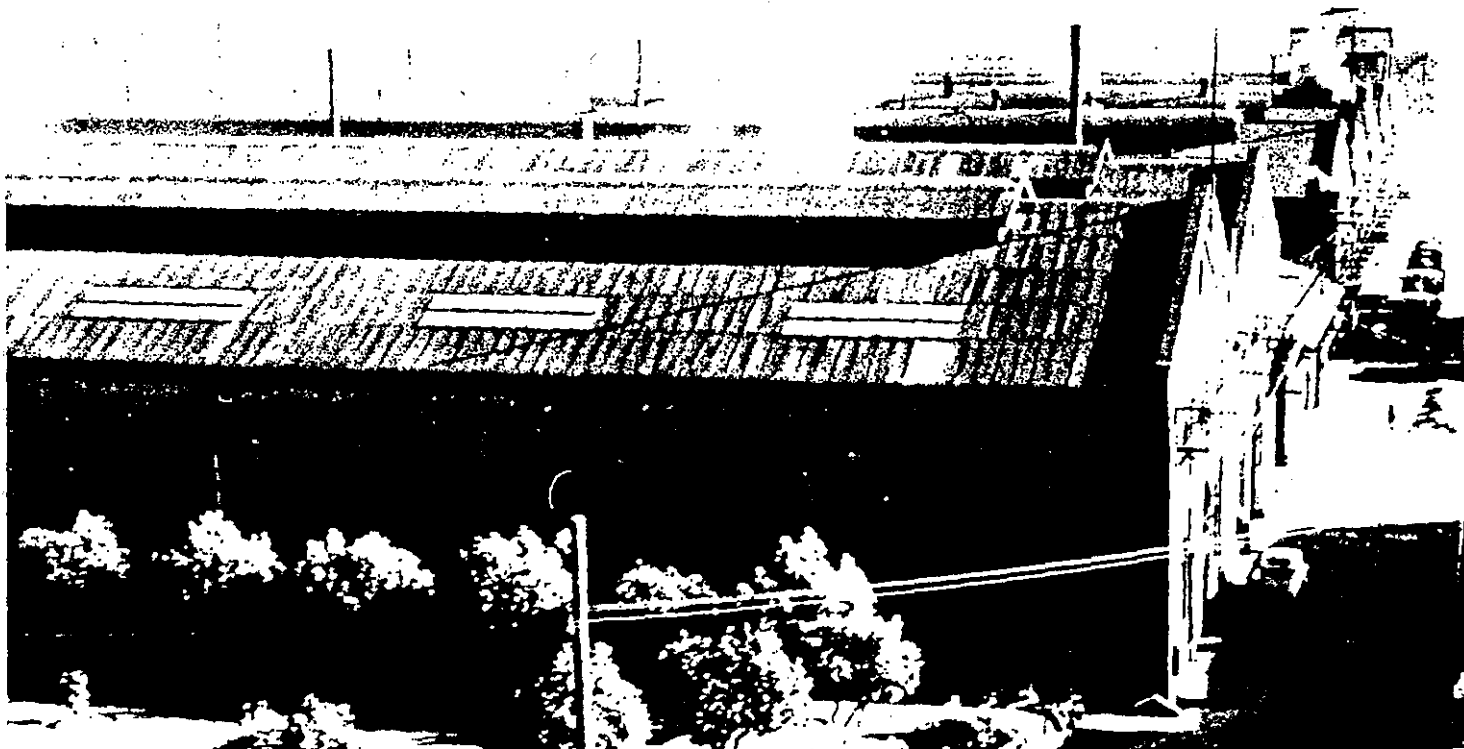
N.S.W.R. Shop Order 7/8/06.

N.S.W.R. Shop Order 17/5/06.

The year 1907 was distinguished by the decision of the Commissioners for Railways to begin the manufacture of new locomotives at Eveleigh and a new building was designed for this purpose. Clearing of ground on the eastern end of the workshops complex commenced in September and construction began shortly afterwards. Known as the New Loco Shop, it comprised two bays, each 200 ft long and 53 ft wide, running parallel to the main workshop bays. Walls were of polychrome load-bearing brick laid in English Bond with double semi-circular arched windows at ground level and segmented arched windows above. Window and door arches were in contrasting dark bricks and a white mortar was used throughout. Windows were steel-framed and multi-paned with sandstone sills. Internally, light steel trusses supported the corrugated-iron double-gabled roof and Globe Foundry iron columns carried these and the overhead crane tracks.

Fewtell, F., Works Manager, 14/5/55.

Fig. 31. Loco Workshops, New Loco Shop. The New Loco Shop was constructed in 1907 specifically to house the construction of new locomotives. In all, between 1908 and 1924 when construction ceased at Eveleigh, 152 locomotives of six different classes were built in this Shop. (C14)



Also during 1907 a new compressor house was established on the south side of the New Loco Shop site. A small building, 65 ft by 48 ft, it contained space for two compressors and two boilers. Construction commenced in September and by the end of the year, two Babcock and Wilcox boilers had been purchased and installed and the Ingersoll-Sergeant compressor had been moved from its location in the Boiler Shop Annexe to the new Compressor House. A second compressor, referred to only as a Franklin, brought the total output of the Compressor House up to 2800 cfm at 100 psi.

N.S.W.R. Shop Order 17/9/07.

Fewtall, F., Works Manager, 14/5/55.

The following two years saw the refurbishment or replacement of many of the operating boilers around the workshops. During 1908, four 'M' class locomotive boilers were installed as stationary boilers in the Boiler House behind Bays 2 and 3, presumably replacing the four installed in 1887. Another 'M' class boiler replaced a condemned boiler in the Boiler House behind Bay 9. Early in 1909, four old E17 class locomotive boilers were installed to replace the four 'A' class boilers in use in the Smiths Shop.

N.S.W.R. Shop Order 28/5/08.

N.S.W.R. Shop Order 14/5/08.

N.S.W.R. Shop Order 4/2/09.

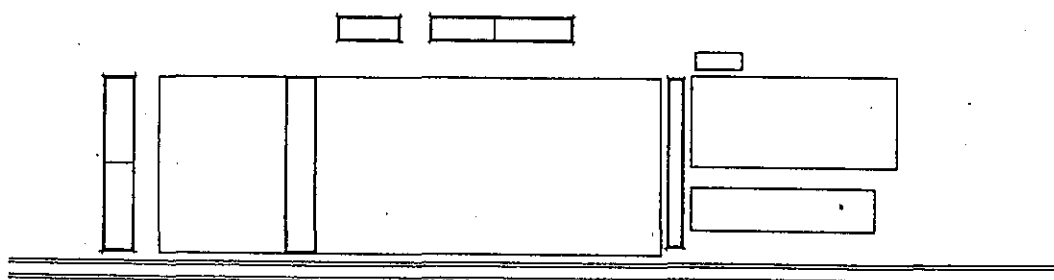
Most overhead cranes in the workshops were all converted to electric drives by 1902. In the Large Erecting Shop there remained four rope-driven cranes installed in 1899 and two electric cranes installed in 1904. Two of the rope-driven cranes were converted to electric drive during 1910. An additional 5 ton Craven electric crane was installed in the No. 9 Bay (Wheel Section). Another significant development in 1910 was the construction of indoor toilet facilities throughout the workshops - the result of labour negotiations for improved conditions.

Fewtall, F., Works Manager, 14/5/55.

N.S.W.R. Shop Order 20/11/09.

In contrast to the almost constant development in the Locomotive Workshops during the two decades

Fig. 32
Loco Workshops : Site Plan - 1905
The No. 4A Bay has been enclosed, the New Tinsmiths and Coppersmiths Shops constructed and the Steam Hammer and Spring Shop established on the eastern side of Bay 1.



1890-1910, operations in the Carriage and Wagon Workshops appear to have proceeded with few major changes or alterations to either the buildings or equipment. During 1901 and 1902 the two steam-driven Ground Traversers were removed from Bay 17 and 23 and new electric external Traversers were installed at either end of the Carriage Workshop building. In 1907, a new building was erected on the northern side of the workshops to house the Carriage and Wagon Blacksmiths Shop. This allowed more room within Bay 21 for expansion of the Woodworking Machine Shop. The gas-plant was upgraded in 1909 by the addition of a 'Mond' 550 hp gas producer, a 450 hp Premier gas engine and a 100 hp Premier gas engine. A hydraulic plant was also installed late in 1909. In 1910, a sawdust exhaust system was installed in the Woodworking Machine Shop, the boiler was removed from the Woodworking Machine Shop, being replaced by steam generated by an 'M' class boiler located in the Blacksmiths Shop, (which had nine of its bays closed in during May and June) and a drive shaft was connected to the Blacksmiths Shop, cross-shafted underground from the Machine Shop opposite.

N.S.W.R. Shop Order 31/1/01 and Shop Order 7/11/01.

N.S.W.R. Shop Order 29/10/07.

N.S.W.R. Shop Order 25/11/09.

N.S.W.R. Shop Order 20/10/09.

N.S.W.R. Shop Order 2/6/10.

N.S.W.R. Shop Order 29/9/10.

N.S.W.R. Shop Order 074/256.

N.S.W.R. Shop Order 11/5/10.

Apart from these minor changes, work on the maintenance and repair of the Railways rolling stock was carried on uninterrupted and new carriages were being constructed at the rate of about ten per week.

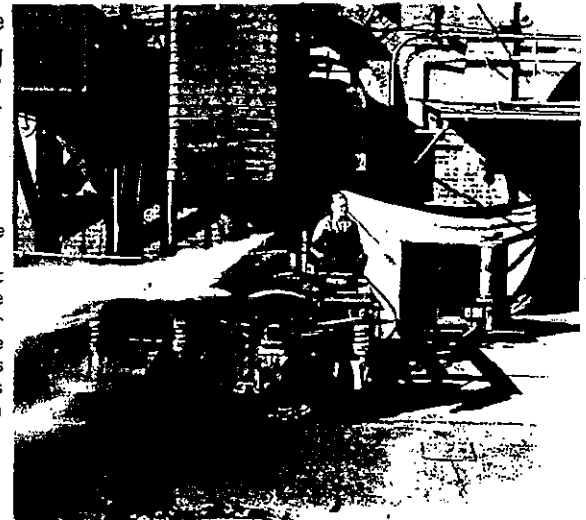


Fig. 33. Carriage Workshops Outside Bay 16. Cleaning a carriage bogey using what appears to be a portable high pressure water unit, the hydraulic power unit for the Carriage Workshops is in the background. The accumulator with its heavy iron weights is halfway up its travel, indicating the system is in operation.

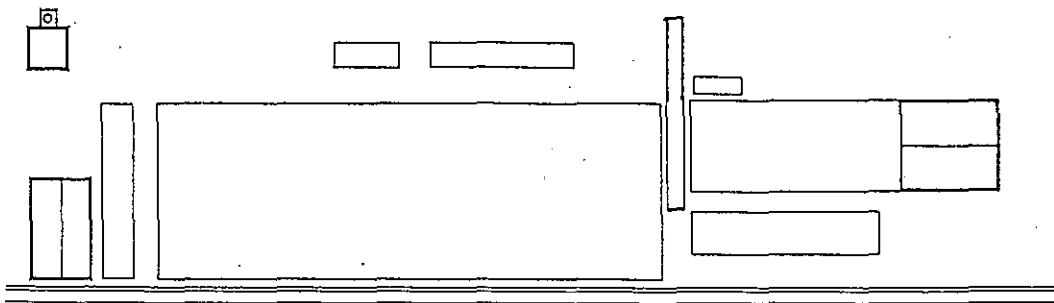


Fig. 34 Loco Workshops : Site Plan - 1910 The New Loco Shop and Compressor House have been constructed and the Large Erecting Shop and its Traverser extended.

**EVELEIGH RAILWAY WORKSHOPS
HISTORY AND DEVELOPMENT
1910 - 1935 WAR, PEACE AND RECESSION**

The years 1911 to 1913 were quiet years for the Workshops. A Grinding and File Making Shop was established in the old Cleaning Annexe behind Bay 9 during 1911. Equipped with three large Pymont sandstone grindstones of about 6 foot diameter and a file testing and cutting machine, it provided a central facility in the Workshops for tool maintenance and repair, as well as more general grinding work. In 1912 a Signal and Telegraph Branch Workshop was constructed in the north-eastern corner of the workshops site, adjacent to the Redfern Station No. 1 Platform. A one-storey brick building consisting of two bays, each 95ft by 24ft, it had a sawtooth roof of corrugated-iron, extruding pilasters and timber-framed windows with brick lintols and sills.

Fewtell, F., Works Manager, 14/5/55.

N.S.W.R. Shop Order 357/256.

The Carriage and Wagon Paint Shop was extended around this time and the area on the western side of the Carriage Repair Shed, known as the Carriage Shop Paddock, was roofed over for additional car repair space. The Paint Shop extension was built on the northern side of the existing shed. It was similar in dimensions and materials though the sawtooth roof of the extension was at a right angle to the direction of the sawtooth roof of the original. The enclosing of the Carriage Shop Paddock was done entirely in corrugated-iron, except that a brick face wall was erected on the southern side facing the Suburban Railway lines. In detail and materials this wall maintained the appearance of the Carriage and Wagon Shop facade adjacent, although it was given a sawtooth rather than the existing gabled profile. In 1913 a footbridge was built across the southern end of the yard for the workmen to cross the tracks more safely.

N.S.W.R. Shop Order 228/256.

N.S.W.R. Shop Order 24/8/12 and Shop Order 19/9/13.

N.S.W.R. Shop Order 256/187.



Fig. 35. Carriage Workshops, Signal and Telegraph Shop. Built in 1912, this building housed the workshops that dealt with all aspects of signalling and telegraphs used to communicate between railway stations. In later years, the telegraph system was converted to a telephone system. (C2 6)

The beginning of 1914 and presumably the outbreak of war in Europe gave impetus to a significant upgrading of facilities and rearrangement of workshops. The New Loco Shop, constructed in 1907, was extended on its southern side by 100 ft to a total of 300 ft, making it equivalent in length to the Main Workshops. The brickwork and internal details of the original building were reproduced in the extension but the roof profile was of the saw-tooth design with copings and parapets finished in sandstone.

N.S.W.R. Shop Order 11/5/14.

Electrification of machinery in the workshops was another major undertaking, with No. 14 Bay (Pattern Shop) completed by the 8th of January, No. 8 Bay (Erecting Shop) and No. 9 Bay (Machine Shop) completed by the beginning of August.

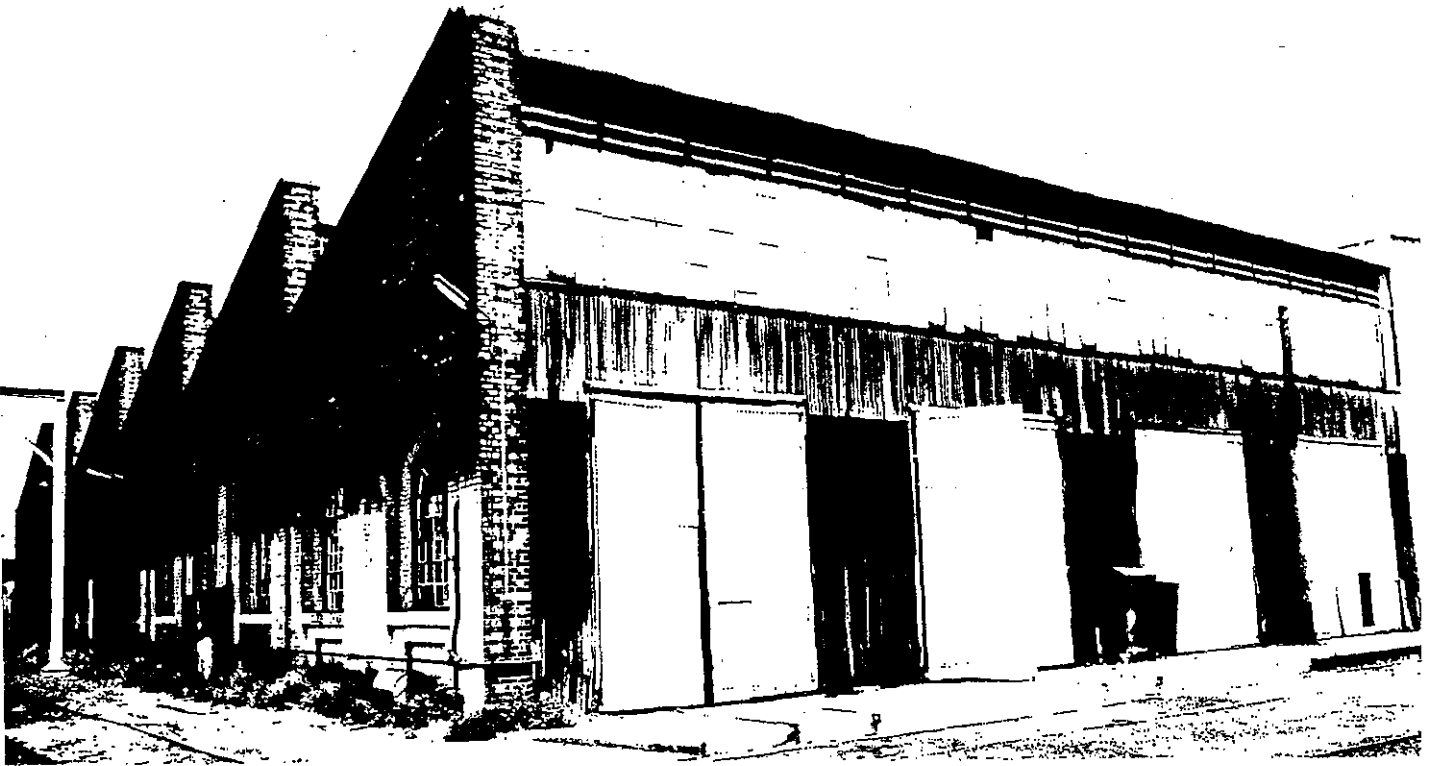


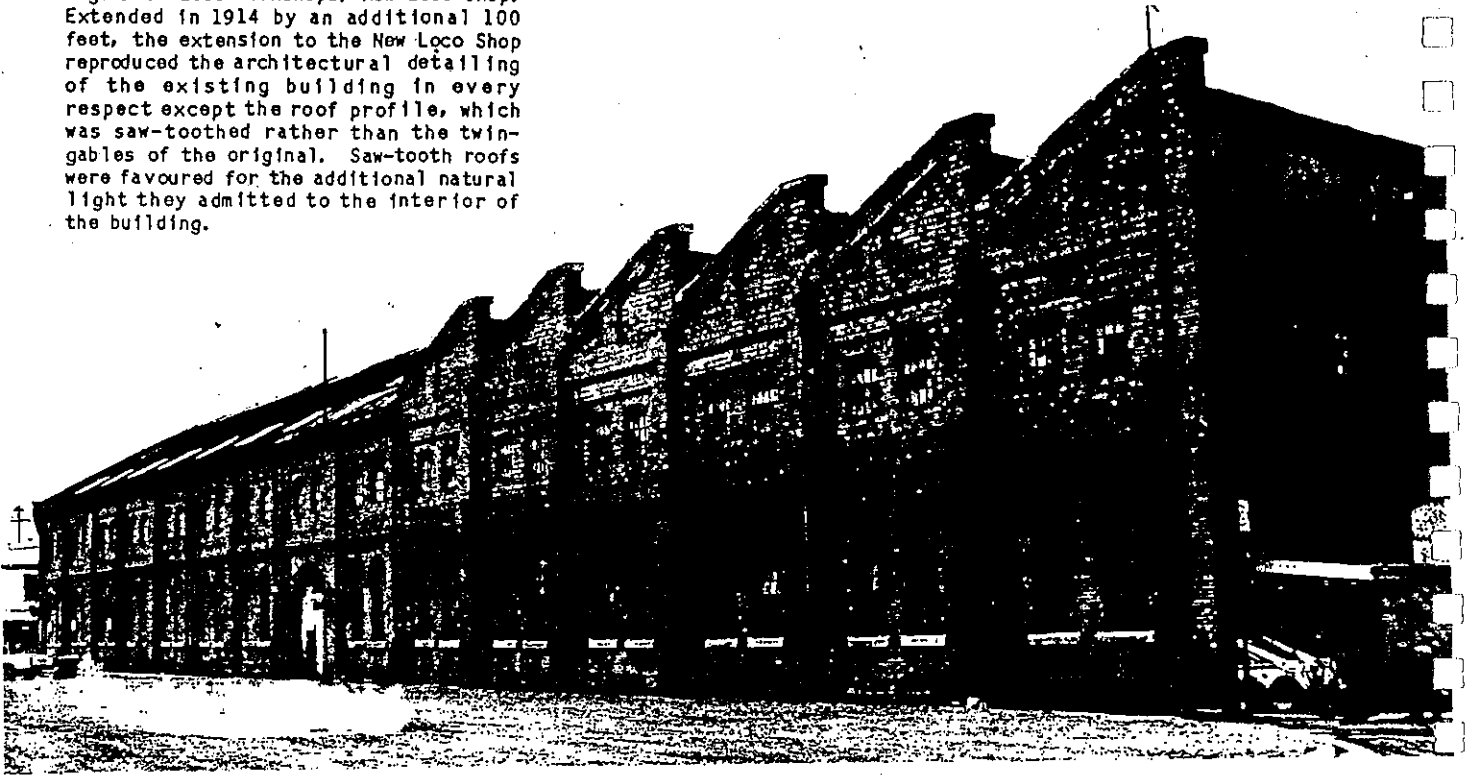
Fig. 36. Carriage Workshops, Car Repair Yard.

In 1912, the area on the western side of the Carriage Workshops was roofed over with corrugated-iron in the saw-tooth profile. The southern facade, facing the main suburban railway lines, was given a brick face wall with arched windows to maintain the presentation of facades established by the existing buildings (S17)

In order to allow an expansion of the Machine Shop, the Laundry was removed from the building adjacent to the Large Erecting Shop and re-established in a new building at Clyde where it still remains, known as the Clyde Laundry. The Millwrights Section and the Water Supply Section then moved from No. 11 Bay to the former Laundry building and the No. 11 Bay became part of the Machine Shop. This was a temporary arrangement while the Machine Shop was reorganised.

Fewtall, F., Works Manager, 14/5/55.

Fig. 37. Loco Workshops, New Loco Shop. Extended in 1914 by an additional 100 feet, the extension to the New Loco Shop reproduced the architectural detailing of the existing building in every respect except the roof profile, which was saw-toothed rather than the twin-gables of the original. Saw-tooth roofs were favoured for the additional natural light they admitted to the interior of the building.



Other alterations included the conversion of the overhead cranes in Bays 9 and 11 from rope-driven to electric drive, the provision of a lockable Tool Room in Bay 14, the lagging of all steam pipes in the workshops with asbestos, the construction of an 110 ft long pit in Bay 4 for the storage of boiler plates and the purchase of two Hawthorn-Leslie mobile locomotive cranes for general use around the yard.

N.S.W.R. Shop Order 331/257.

N.S.W.R. Shop Order 30/6/14.

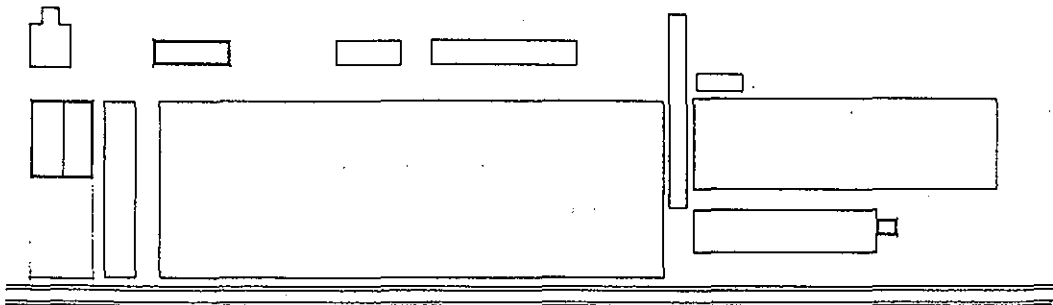
N.S.W.R. Shop Order 257/346.

N.S.W.R. Shop Order 4/7/14

With the expansion in the use of compressed-air in the workshops, an additional air-compressor, manufactured by Ingersoll-Rand and of 2600 cfm capacity, was installed in a new compressor house in the Foundry building. This was augmented early in 1915 by the installation of a second Ingersoll Rand compressor of 330 cfm capacity.

Fewell, F., Works Manager, 14/5/55.

Fig. 38
Loco Workshops : Site Plan - 1915
The New Loco Shop has been extended, the Oliver Shop established and a Compressor House added to the Foundry.



On the Carriage side of the Workshops, a large two-storey stores building was constructed west of the timber shed in the Stores Branch complex. The other stores buildings were less substantial timber and corrugated-iron buildings, built at various times since the establishment of the Workshops, all administered by the Railways Stores Branch. The new building rationalised much of the Stores Branch's activities under one roof in the centre of this area. Measuring approximately 200ft x 50ft, the building was of brick with sandstone sills, lintols and copings. The single gable roof was clad in corrugated iron. The long walls were finished without decoration but the short end walls were topped by high castellated parapets, with full length pilasters giving relief to the facade.

N.S.W.R. Shop Order 257/38.



Fig. 39. Carriage Workshops - Stores Building.

This building was constructed to rationalise the existing Stores facilities which had been housed in a collection of tin sheds in this area. The Railways Stores Branch had been on the Eveleigh site since its earliest days but were an operation entirely separate from the workshops.

Developments during 1915 continued the programs initiated the previous year. The No. 7 Bay Ground-Traverser was converted to electric drive, the Machine Shop wall-mounted steam-engines were replaced by electric motors and an additional 25 ton electric overhead travelling crane was installed in No. 4 Bay.

Fewtell, F., Works Manager, 14/5/55.

N.S.W.R. Shop Order 18/12/15.

Following the rearrangement of the Machine Shop, the Millwrights moved from the former Laundry into a section of No. 9 Bay. The Water Supply section, concerned with the supply of all taps, pipes, connections, tanks and other material concerned with the provision and use of water in the railways, also moved out of the former Laundry to a new workshop at Erskineville and the laundry building was subsequently demolished.

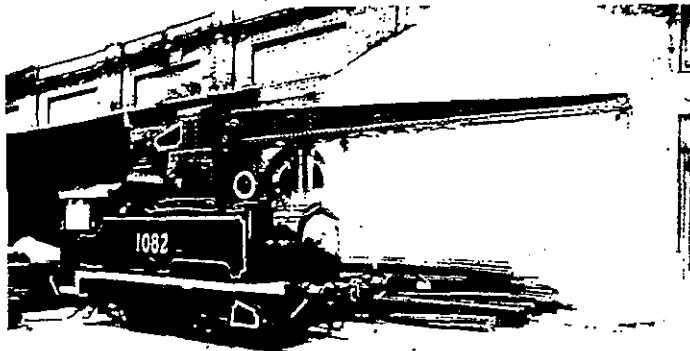


Fig. 40. Hawthorne-Leslie Locomotive Crane.

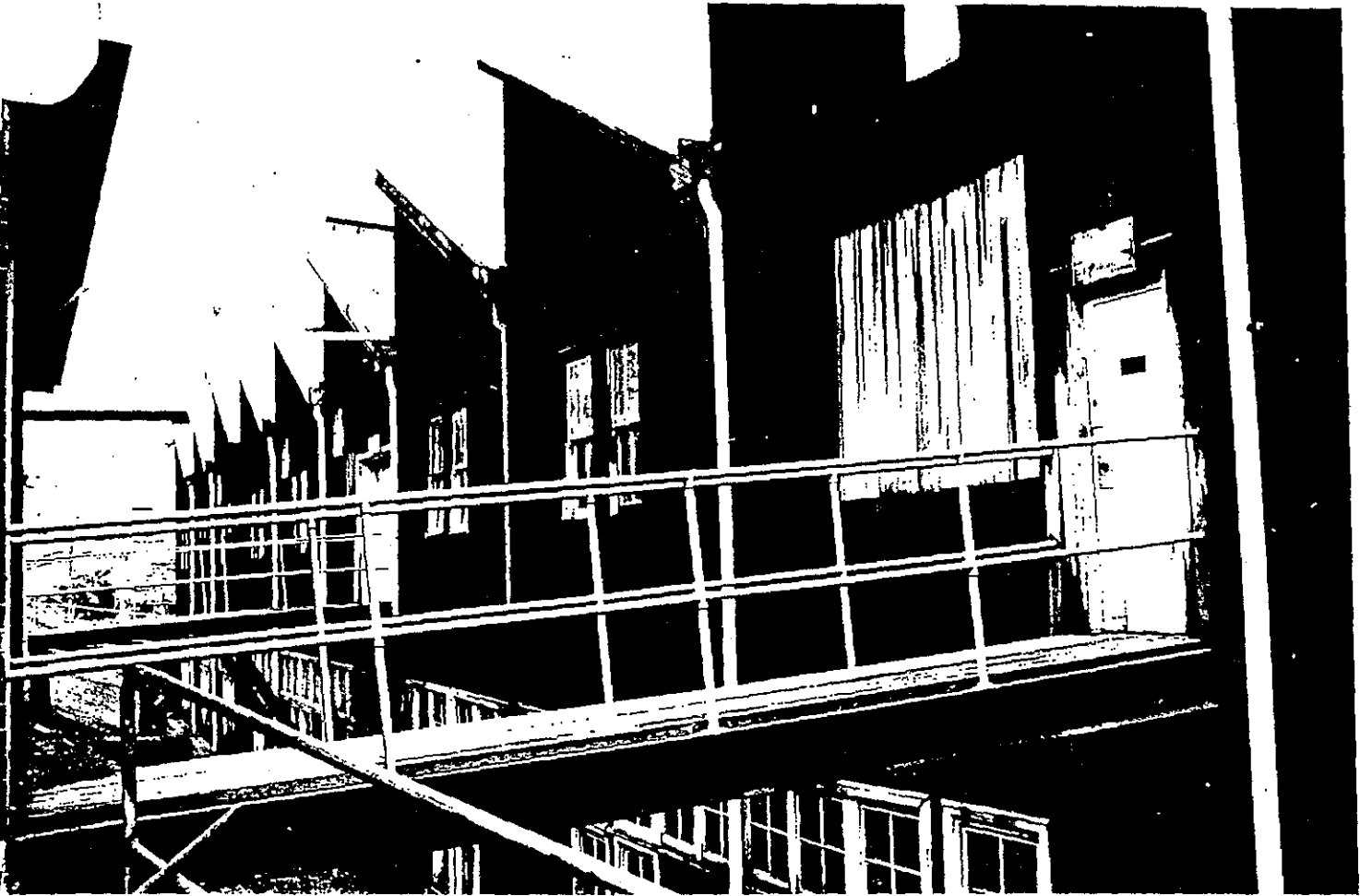
Two of these cranes were purchased in 1914 to provide mobile lifting facilities around the yard. Essentially a small locomotive steam engine, the steam also powered a crane and winch which were mounted above the locomotive boiler. (V21)

During 1916, electrification of machinery in the Machine Shop (Bays 10-13) was completed on the 3rd of June. Ajax forging machines were installed in the Blacksmiths Shop and a locomotive weighbridge was purchased and erected in the yard. As part of the war effort at this time, a trial production run of 5,000 18lb field-gun shells was made in the workshops using machines modified for the purpose. This was discontinued because the machines were on the whole inappropriate and the whole arrangement judged to be unsatisfactory for both the Army and the Railways.

Fewtell, F., Works Manager, 14/5/55.

In 1917, a new Foundry building and a new Pattern Shop building were constructed on the southern side of the workshops. This required a resumption of two acres of land on the south-western end of the site to allow a rail siding to be built to connect to these two new structures. Both buildings were timber and steel framed, corrugated-iron clad with corrugated-iron roofs. They were both completed and in operation by December, 1917.

N.S.W.R. Shop Orders 258/272, 40/254 & 2160/259.



The Pattern Shop was built on two levels, the slope of the land at this point allowing ground level access to both floors. The upper level contained the Joinery Section in which all the patterns were manufactured. The lower floor was a large storage area for the patterns. The old Pattern Shop in Bay 14 of the Workshops was vacated and subsequently became part of the Machine Shop.

The new Foundry was provided with three separate sections, one each for iron, brass and steel castings and all new furnaces and machine moulding equipment was installed. The old foundry adjacent to the Large Erecting Shop was converted during 1919 to a Boiler-Mounting Section for fitting-up boilers with their necessary appliances, an Assembly Depot for storage of finished parts till required in the workshops and a Boiler Repair Shop for refurbishing boilers already in service.

Sometime prior to 1917, a Potash Washing Plant was established in a small corrugated-iron shed between Bay 15 and the site of the new Foundry. Containing large Potash tanks served by a hand-operated overhead crane, it was used to wash the grease and dirt from detail parts of locomotives, facilitating the operations of the various shops that may be required to work upon the parts.

Fig. 41. Loco Workshops, Pattern Shop. Built in conjunction with the establishment of the new foundry, the pattern shop had two levels with access allowed by the slope of the land to both levels. The lower floor housed the extensive collection of existing patterns while the upper floor contained the Joiners and Patternmakers workshop. (X34)

Fewtall, F., Works Manager, 14/5/55.

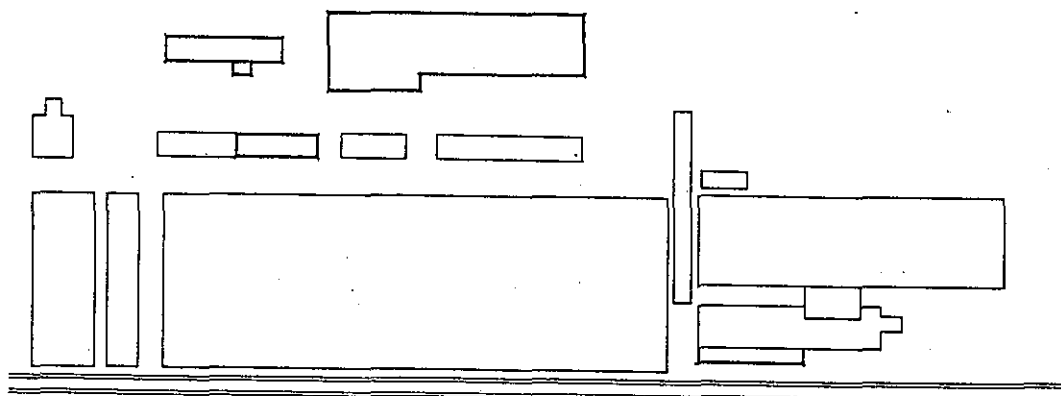
Inst. of Eng. Syd. Div., 11/10/22.

N.S.W.R. Shop Order 156/259.

N.S.W. Railway and Tramway Magazine, 12/17, p.37.

With the completion of the new buildings and the transfer of operations from the workshop building, the remaining shops were rearranged and rationalised. The Steam Hammer Shop was moved to a new shed behind Bay No. 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 No. 9 Bay to the northern side of Bay 15, which continued to house a Locomotive Store, much reduced in size, in its southern side. An additional development was the establishment of a photographic office in June, 1919 in rooms attached to the Tinsmiths Shop.

Fig. 42
Loco Workshops : Site Plan - 1920
The major construction was the new Foundry and the new Pattern Shop on the southern side of the workshops.



□

The Steel Foundry section of the new foundry was opened in 1919 using an oil-fired Stock Steel Converter as its main furnace. By 1922, it was deemed necessary to have an electric furnace for this section and a major extension of the Steel Foundry was undertaken for this purpose. Added on to the western end of the Foundry building, the extension and furnace installation was completed by November, 1923.

Inst. of Eng. Syd. Div. 11/10/22.

N.S.W.R. Shop Order 437/260.

In March, 1922 work commenced on an extension to the Works Managers and Timekeepers Office building in the north-east corner of the Locomotive Works. The twin-gabled two-storey building was extended on its western side by 36 feet on both levels, putting the bell tower into a central position in the building and the bull-nosed verandah supported on cast-iron columns with elegant iron lace capitols was extended, encircling the ground floor.

Other developments of 1922 included the removal of the No. 7 Bay Ground Traverser and the conversion of this bay into another workshop with a 35 ton electric overhead crane installed. A Grinnell fire-sprinkler system was installed in the Pattern Shop by Wormald Bros. in November and Calder House, used as the Works Manager's Residence since 1887, was vacated due to its poor condition. It was destroyed by fire in 1924.

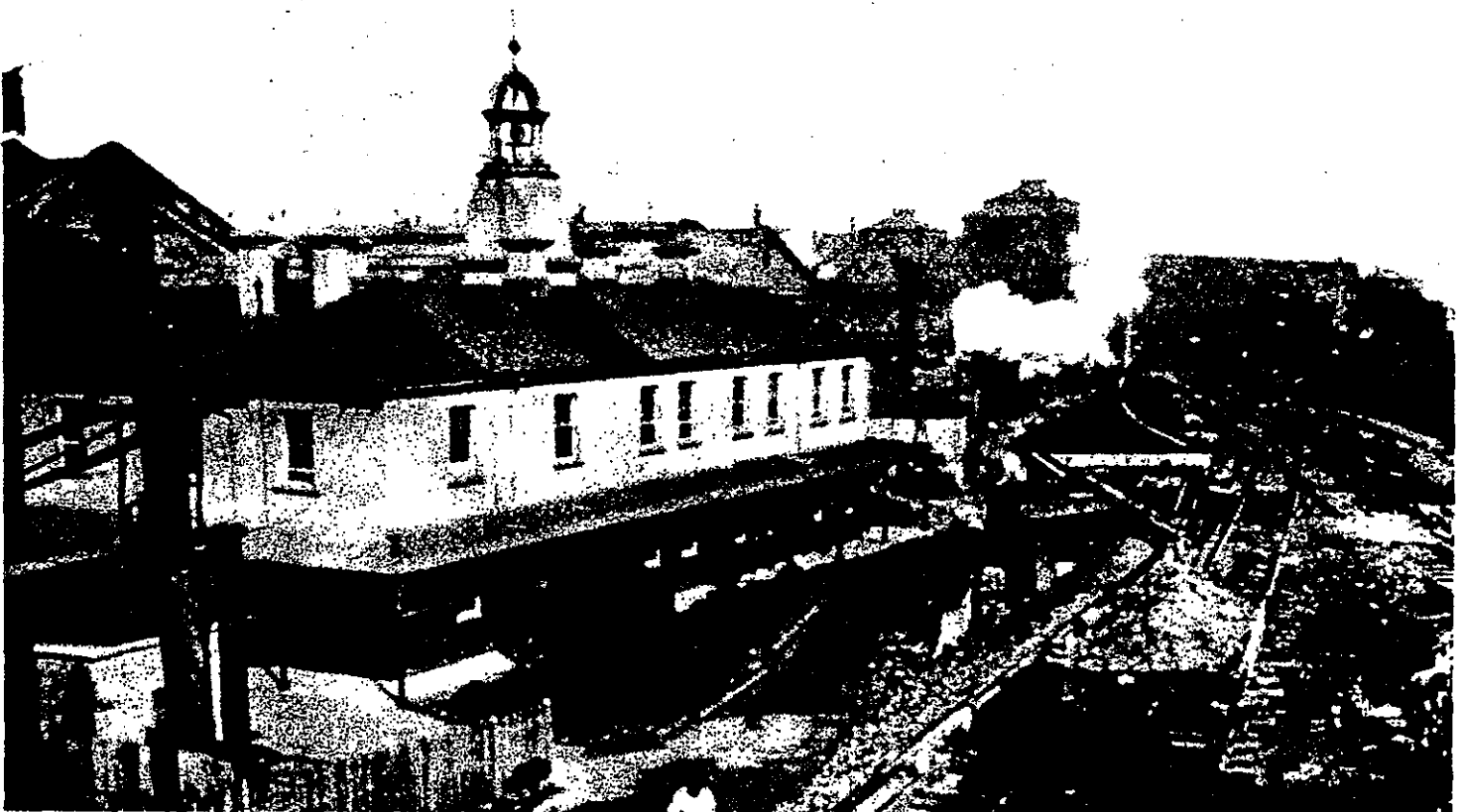
In 1923, a major portion of the boiler repair work was shifted to a new facility established at Chullora. Two additional 35 ton C.J. Hasemer overhead cranes were installed in the Large Erecting Shop in July.

N.S.W.R. Shop Order 226/260.

Fewtall, F., Works Manager, 14/5/55.

Fig. 43. Loco Workshops, Works Managers Office.

1918 to 1928 saw enormous changes to the workshops at Eveleigh, with significant expansion of facilities, new buildings and additional lines and tracks. In 1922, a large extension was added to the western end of the Works Managers Office. The construction of the Illawarra line dives was commenced shortly after this was completed. (A6)

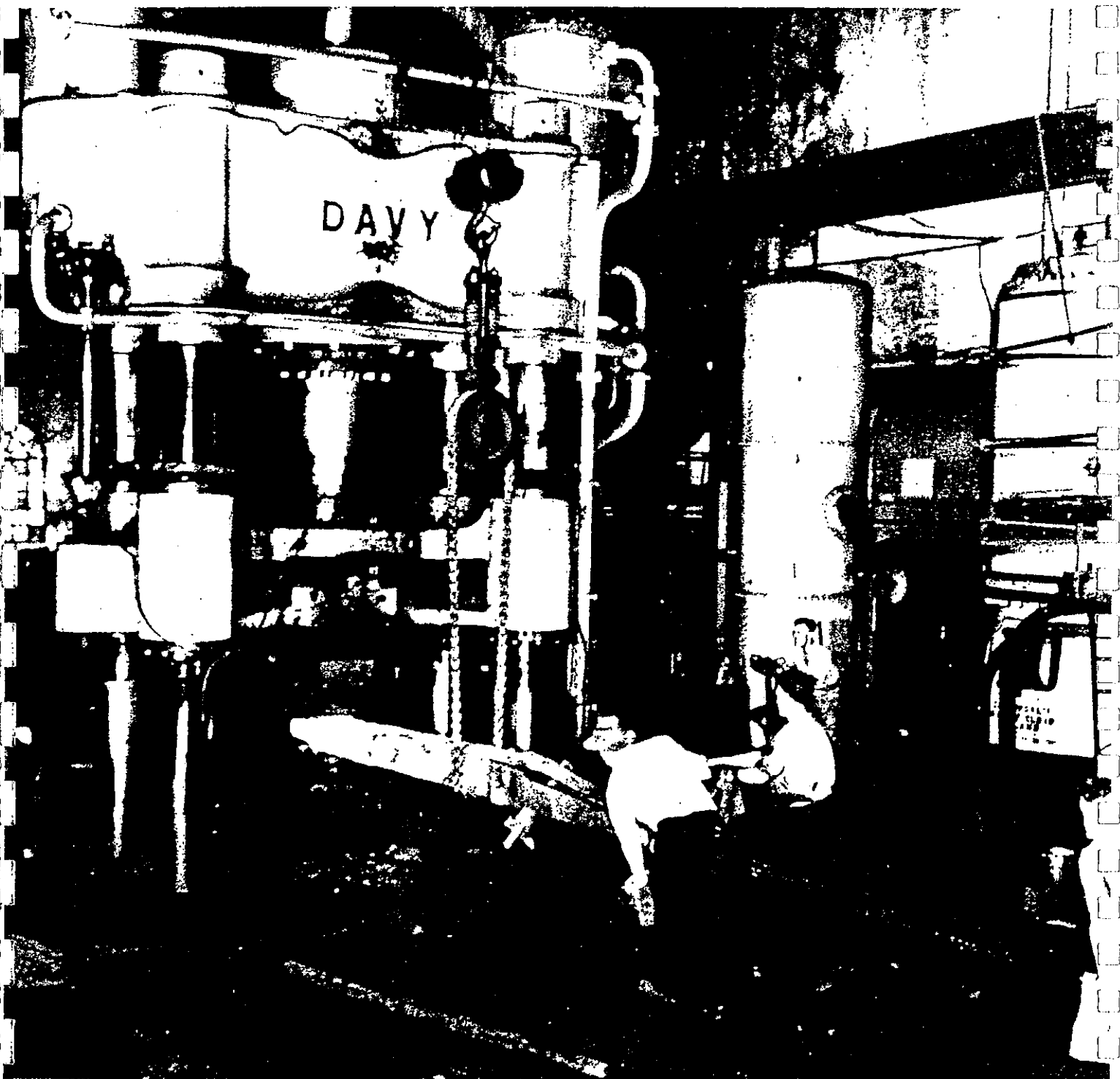


The following year, 1924, was marked only by the purchase of an Asquith portable radial drilling machine, some unspecified file cutting equipment and the installation of buffers on three of the overhead cranes in the Large Erecting Shop.

1925 produced more significant changes. The No. 1 Blacksmiths Shop in Bay 1 was completely rearranged and a 1500 ton steam-driven "Davy" press was installed in the northern side. Imported from England, it was used for the forging of the heaviest parts used on locomotives. Two boilers were installed with it to provide steam to drive the air-compressor which drove the press and the boilers were orientated through the eastern wall of the building with the furnaces inside and the flues outside. The furnaces did double-duty as heating furnaces for the metal to be pressed on the Davy.

Fewtoll, F., Works Manager, 14/5/55.

Fig. 44. Loco Workshops, Blacksmiths Shop, Bay 1. In 1925, the northern half of Bay 1 was cleared and a 1500 ton capacity 'Davy' press was imported from England and installed. Powered by a steam-driven air-compressor, it had two boilers of its own installed to provide the necessary steam, the furnaces also being used for heating the material being worked on the press. (A19)



The quadruplication of the Illawarra Line in 1925 brought, as an initial step, the demolition of the northern bay of the Running Shed to provide more room in the yard for these lines. The two remaining bays were unaffected.

Also in 1925, construction commenced on an elevated timber coal stage on the northern side of the workshops, a 40,000 gallon water tank was erected on high ground near Cornwallis Street and plans were approved and construction commenced on a subway under the main yard.

Wylie, 1963, in A.R.H.S. Bulletin 291-314, p.945.

E.W.C.S.C., 1968 in Eveleigh News No. 377.



Fig. 45. Eveleigh Railway Yard, Illawarra Junction Signal Box. Following the quadruplication of the main suburban rail lines and the completion of the construction of the Illawarra lines, the Eveleigh Railway Yard became a complicated array of tracks, sidings and junctions leading to the Central Station terminal. The management and safe-working of the yard was conducted from the elevated Illawarra Junction Signal Box. (A9)

As these works were underway, elsewhere in the works the mounting pressure on Locomotive repair facilities led to, in 1925, the decision to cease the manufacture of new locomotives at Eveleigh. The New Loco Shop was from this time used largely for locomotive repair work. Up to this time, one hundred and fifty-three locomotives had been constructed at Eveleigh. Twenty-two C32 class locos were commenced in March 1908, followed by five C34 class locos commenced in December, 1909, fifty C30 class locos commenced at the end of 1911 and thirty D53 class commenced in April 1913. Thirty-five C35 class locos were built between 1914 and 1923 and ten C36 class locos were built during 1924.

Fewtall, F., Works Manager, 14/5/55.





Fig. 46. Locomotive Running Shed, Eveleigh, 1930's.

The expansion of the yard and tracks due to quadruplication and the Illawarra lines brought, with the need for additional space, the demolition of the northern bay of the Locomotive Running Shed in 1925. The ridge and furrow roof profile of the original design had been converted to the louvred monitor and glazed skylight panels in 1905.

The elevated timber coal stage was completed in mid-1927. Constructed of 12 inch by 12 inch ironbark posts with 14 inch by 7 inch cross-members arranged in a simple truss, it stood 28 feet high and carried an elevated track for coal trucks to deliver coal into one of eleven hoppers for discharge to locomotive tenders standing on the lower track running beneath the stage.

Other developments around this time that affected the Eveleigh Railway Yard were the electrification of the suburban rail lines and the construction of the Illawarra dives by cut and cover methods, completed in July of 1927. The subway under the Yard, commenced in 1925, was also completed in July, 1927 for a final cost of 1850 pounds.

By the end of the year, a new Tinsmiths and Plumbers Shop had been built on the bank above the Pattern Shop. Of corrugated-iron on a timber frame, it was established to give both these sections more spacious accommodation as their operations had outgrown their previous shops over the twenty-five years since they moved in. The former Tinsmiths Shop adjacent to the Wheel-Press House was subsequently converted to a Welding Shop, welders having previously been housed in several different areas. The Grinding Shop was closed at this time and was later used for various other purposes.

E.W.C.S.C., 1968 in Eveleigh News No. 377

Fewtall, F., Works Manager, 14/5/55.

In February of 1928, two new Traversers were installed in the Large Erecting Shop at a cost of 7058 pounds. This appears to be the last new building or purchase of new equipment that occurred in the workshops until 1935, the period of the Great Depression. Apart from this lack of growth, the Workshops appear to have managed through the difficult times without major setbacks.

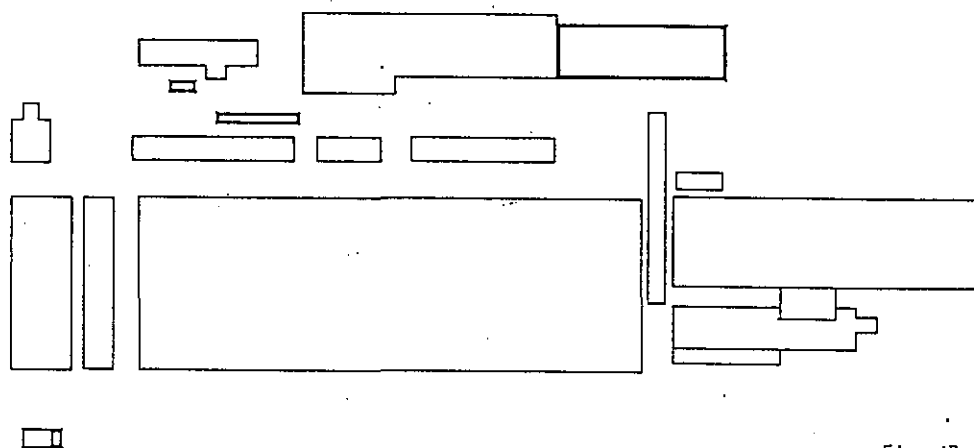


Fig. 47
Loco Workshops : Site Plan - 1930
The new Steel Foundry and the new Tinsmiths and Plumbers Shops have been constructed. The Works Managers Office has been extended.

The equivalent period 1910-1935 brought far less activity and development in the Carriage and Wagon Workshops than for the Locomotive Workshops. 1913 saw extensions to the Paint Shop and the Carriage Repair Yards, as previously mentioned, with the construction of the large stores building in 1914. The Traverser between the Paint Shop and the Wagon Shop was extended in 1915 and two 25 ton T. Goodall and Co. electric overhead cranes were installed in 1920. Although the dates are unclear, a number of buildings came into existence in the Carriage Workshops area that were erected between 1914 and 1924. The Materials Testing Laboratory was established in a large two-storey brick building on the ridge beside the Chief Mechanical Engineers Office. The roof was a hipped single gable clad in red terracotta tiles. Below this on the flat ground to the east of the Paint Shop were two adjacent stores and general workshops buildings constructed in weatherboard and fibro, both single storey buildings with corrugated asbestos concrete roofs. On the western end of the Carriage Workshops, in the Stores Branch area, a residence was constructed of brick with corrugated iron roof near to the Stores buildings.

N.S.W.R. Shop Order 21/6/15.



Fig. 48. Carriage Workshops, Stores Residence.

Whether originally built as an office or a residence for the controller of the Stores Section, this small building spent most of its time as the Hostel and Canteen Manager's Office, following the conversion of the Stores building to a Hostel. (C2 24)

To the west of this was a large timber framed, corrugated-iron clad oil storage shed with a timber loading platform on its southern side. All of these structures were in existence by September, 1924. 1924 also saw air-driven spray-painting equipment installed in the Paint Shop. During 1927, the buildings, traversers and sidings around the shops were altered to create 6 roads of track into the workshops. In 1929, the gas supply was connected from the Department's gas works to the Paint Shop. Nothing further occurred till 1934 when a buffet or canteen was erected and the old Ambulance Room was removed, to be replaced by a new facility in 1937.

N.S.W.R. Shop Order 265/263.

Fig. 49. Carriage Workshops, Train Equipment Stores.

Erected during the 1920's as a drawing office and unspecified workshop, these buildings have housed a variety of uses leading to their present use as Train Equipment Stores. (C2 36)

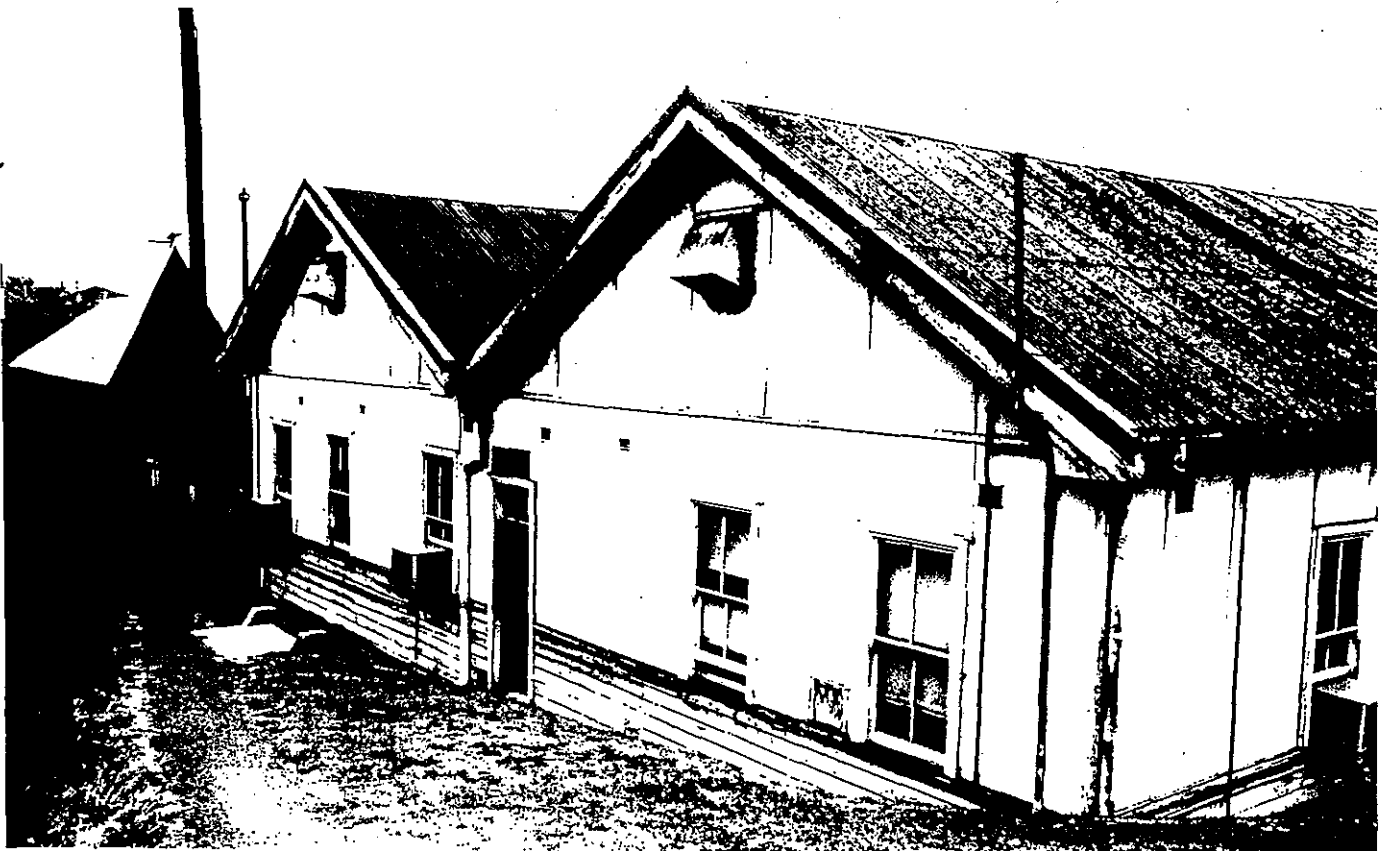




Fig. 50. Carriage Workshops. The extension to the Paint Shop, erected in 1912, was built in corrugated-iron, having a similar design and arrangement as the original, except that the saw-tooth roof was orientated at 90° to the original. The Trimming Department was moved into the enormous corrugated-iron shed at some stage during the 1930's, a temporary arrangement that lasted for the next fifty years. (B 2-9)

**EVELEIGH WORKSHOPS
HISTORY AND DEVELOPMENT
1935 - 1970 FROM EXCELLENCE TO OBSOLESCENCE**

By 1935, the Eveleigh Workshops had grown into a solid and mature operation, with its role within the Railway's system established and complete. Eveleigh was the central Locomotive and Carriage and Wagon Repair facility as well as handling most of the heavy forging and parts casting for the system. Technology brought in with the twentieth century, electricity and steel for example, had been embraced and adopted where appropriate and the interrelationships between various departments and shops were well established. The improvements made during the early 1920's were obviously sufficient to carry the works through the Depression without mishaps or problems and it's not until the latter half of the 1930's that new equipment was required. The advent of the Second World War then brought changes of a different kind.

During the financial year 1935/36, the air-compressor plant was upgraded by the addition of a 750 cubic feet/minute electric air-compressor installed in the Compressor House adjacent to the existing steam-driven compressor. Acquired from the Walsh Island Dockyard, it enabled the steam compressor plant and the two Babcock and Wilcox boilers to be taken off line and overhauled.

The lack of development at Eveleigh during the 1930's was also related to the development of other Workshops in the system - with Eveleigh established and running smoothly, new constructions and developments in other departments could be undertaken at the other Workshops. In 1937, the opening of a new large locomotive repair depot at the Chullora Workshops enabled 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. The machinery and equipment appears to have been left in place for sometime as the transfer of machinery to Chullora was not completed till May 1940.

Two Massey electro-pneumatic vertical hammers were installed in the Oliver Shop during 1938, a year also notable for the installation of eleven separate shower facilities around the workshops. Two were installed in the New Loco Building, 2 in the Boiler Shop, 3 in the Tender Shop and 4 in the Large Erecting Shop. These were completed by March, 1939.



Fig. 51. Loco Workshops, New Loco Shop. There was no work involving the maintenance and repair of Locomotives that could not be carried out at Eveleigh. Two or three cranes combined could lift the largest locomotives for, as in this case, the replacement of bogies or any other work. The additional light available by the use of the saw-tooth roof arrangement is apparent in the southern half of the building. (C22)

Fewtall, F., Works Manager, 14/5/55.

Fewtall, F., Works Manager, 14/5/55.

With the outbreak of war in Europe, negotiations between the Department of Defence and the Railways Department were initiated again as all heavy engineering shops throughout the country were pressed to assist in the manufacture of military equipment. The lessons of the First World War experiment had been learned and in early 1940, Bays 5 and 6 were cleared of machinery and plans drawn up for the installation of equipment supplied by the Department of Defence for the manufacture of 25lb field-gun shells. A mezzanine floor supported on timber columns was added to Bay 5 and the machinery installed by February, 1941. The Tender Shop (Bay 8) was altered in May 1941 to suit a munitions annexe and one bay of the New Loco Shop was utilised for the assembly of tanks supplied from elsewhere in parts. This latter arrangement lasted only until a better location was found elsewhere in the Railway Workshops system. Another contribution to the war effort was the manufacture of the special tools required in the manufacture of Bren Guns. Although the guns were manufactured in Defence Department factories, the whole of the machinery required was manufactured in the Machine Shop at Eveleigh.

Fewtall, F., Works Manager, 14/5/55.

These arrangements were in general a temporary solution while the Defence Department organised its own factories. By 1943, Bay 8 was vacated and the Millwrights gradually transferred from Bay 15 to this location. By 1944, the tank assembly section had vacated the New Loco Building and the space was subsequently adopted as an extension of the Machine Shop for the heaviest and largest machining work.



Fig. 52
Carriage Workshops - Ambulance Room
Constructed in 1937, this Ambulance Room has thick brick walls, a tiled roof and overhanging eaves to provide a cool and quiet environment for injured or ill workers.

On the Carriage Workshops side, the war saw the building of several temporary barracks-type accommodation buildings and the conversion of the large brick stores building to a hostel for the accommodation of transient railway employees and Defence Department workers. A canteen building and kitchen were constructed adjacent to the hostel. The stores residence was used during this period as the Hostel and Canteen Supervisors Residence.

Additionally, at some time during the 1930's, the large corrugated-iron shed housing the Trimming Shop was erected in the location of the 'Calder House' which had burned down in 1924.

About 1942/43, concrete air-raid shelters were erected in various locations around the Workshops, generally against embankments or in sheltered corners of the site. Small box-like structures, they were designed more as protection from flying debris than as full scale bomb shelters.

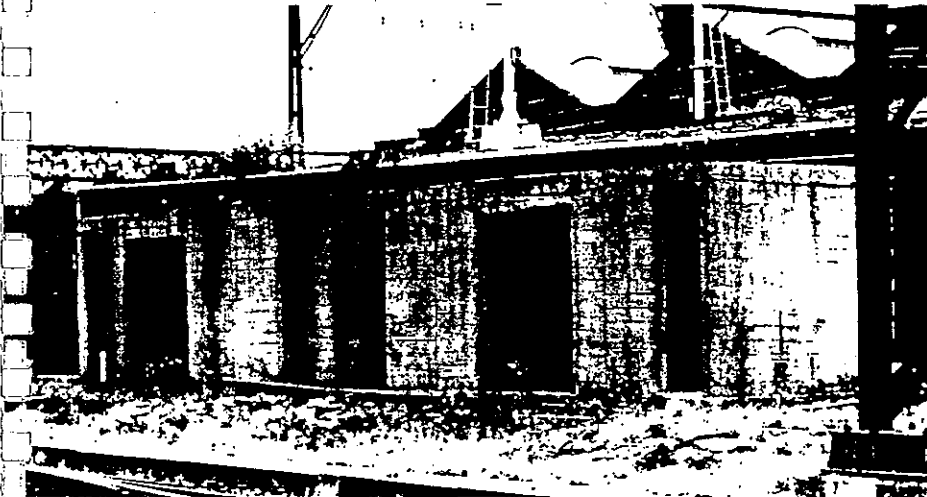


Fig. 53
Loco Workshops - Bomb Shelter
During the Second World War, several reinforced concrete box-type bomb shelters were erected in convenient locations around the workshops. Fortunately, they were never required.

During 1944, plans were drawn up and construction commenced on a major extension of the Works Managers Office, transforming it into a much larger building. The alterations were sympathetic to the original but changed it significantly with extra and larger windows fitted, internal walls and openings changed and an additional section built on the eastern side. These alterations were completed by the end of 1947.

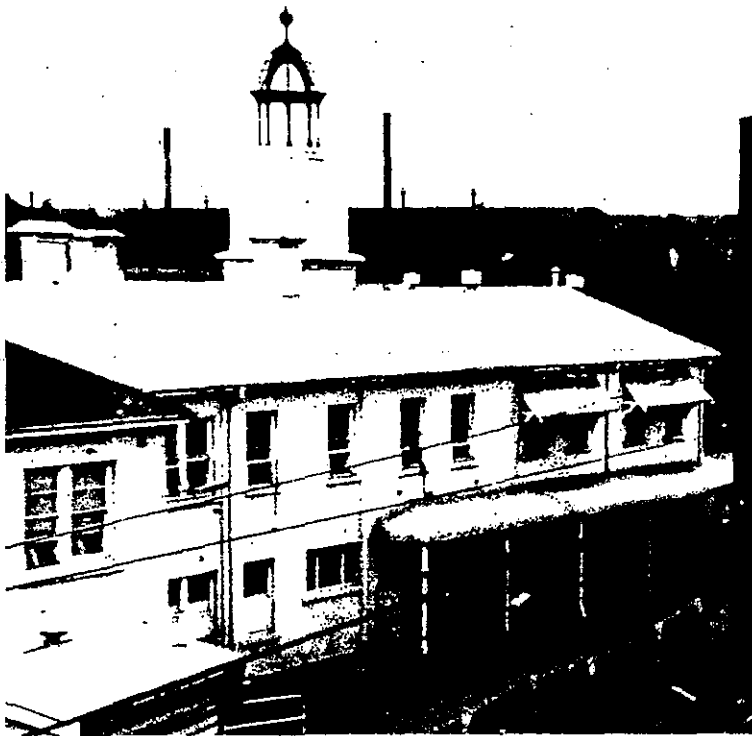
Plans: N.S.W.R. Ways and Works Branch No's.
102/144 to 102/146, 23/3/44.

At the same time a large addition was erected on the southern side of the Foundry to house new staff amenities for the foundry staff. Of two storeys, it contained shower and locker room facilities on the lower floor and a meal room on the upper level sufficient to accommodate three hundred men.

Plan: N.S.W.R. Ways and Works Branch No.
975/34.215, 8/12/43.



Figs. 54 + 55. Loco Workshops - Works Managers Office. Between 1944 and 1947, a twin-gabled addition was made to the Works Managers Office on the eastern side to provide additional administration space. Maintaining the architectural detailing of the original, it was of similar proportions and materials. (Q 34, A2)



With the end of the war in 1945, the production of 251b field gun shells in Bay 5 ceased and the machinery, owned by the Defence Department, was removed soon afterwards. The Workshops settled back into their normal routines with only few alterations and additions over the next few years.

1945 also saw the reintroduction of the construction of new locomotives at Eveleigh. The first locomotive, a C38 class number 38-06, rolled out of the Large Erecting Shop on the 29th of November, 1945. The first five of this class were built at the Clyde Workshops, then Eveleigh built the even numbered locos and Clyde built the odd, each producing a further thirteen. The last one of this class was completed in September, 1949, to be replaced in production by D58 Class locos, the first of which was completed at Eveleigh on the 19th January, 1950. Thirteen of this class were built, the last being completed in April, 1952. No further new locomotives were constructed at Eveleigh after this time. All of these locomotives were built in the Large Erecting Shop.

Fig. 56. Loco Workshops, Large Erecting Shop.

In 1945, the construction of new locomotives was recommenced at Eveleigh, this time being undertaken in the Large Erecting Shop. The first of these, a C38 Class Number 38-06, was rolled out on the 29th November, 1945. Twenty-six locomotives of this and the D58 class were constructed between 1945 and 1952. (G 34)



In 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 the Blacksmiths Shop (Bay 1) was undertaken in October of that year. In March 1947 eighteen 25 cycle AC welding power points were installed around the Workshops. In 1948 a five ton electric overhead crane was installed in the Potash Tank House in addition to the hand-operated crane already installed.

Fig. 57. Loco Workshops, Foundry.
 In 1944, an extensive staff amenities centre was constructed on the southern side of the Foundry for the foundry staff. Hidden between the foundry and the now demolished Alexandria Goods Shed, little attempt was made to integrate it the existing building design. It was supported on columns above a siding which extended to the Pattern Shop nearby. (W 31)



In February 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.

Few developments or alterations occurred during the 1950's apart from the cessation of new locomotive construction in April 1952 and the addition of two new electric air-compressors of Australian design built by Thompson's of Castlemaine, each of 1500 cfm capacity, which were installed in 1954.

Fewtall, F., Works Manager, 14/5/55.



Fig. 58. Loco Workshops - Boiler Mounting and Repair Shop.
 Following the establishment of the new Foundry in 1918, the old foundry building became a Boiler Mounting and Repair Section, its close proximity to the Large Erecting Shop minimising the distance required to move these large items. (D 33)

The national coal strike of 1949 brought a host of difficulties for the railways with their dependence on coal as a fuel supply.

Although the crisis was endured without serious setback, much of the Gasworks machinery was severely damaged by the low grade brown coal it was forced to use during this period. As a consequence about 1958 the gas manufacturing plant was demolished and the Workshops began drawing gas from the city supply, using the old gasworks as a storage and distribution centre.

Fig. 59. Eveleigh Railway Yard, Departmental Gas Works.

Since the earliest days of Eveleigh, the Railways Department had manufactured its own coal gas in a plant adjacent to the Carriage Sheds in the south-western corner of the site, coal being easily available during the era of steam trains. The equipment was damaged during the Coal Strike of the late 1940's by the use of inferior grades of coal. In 1958, with the steam era nearly over, the decision was made to demolish the plant. (U 3)

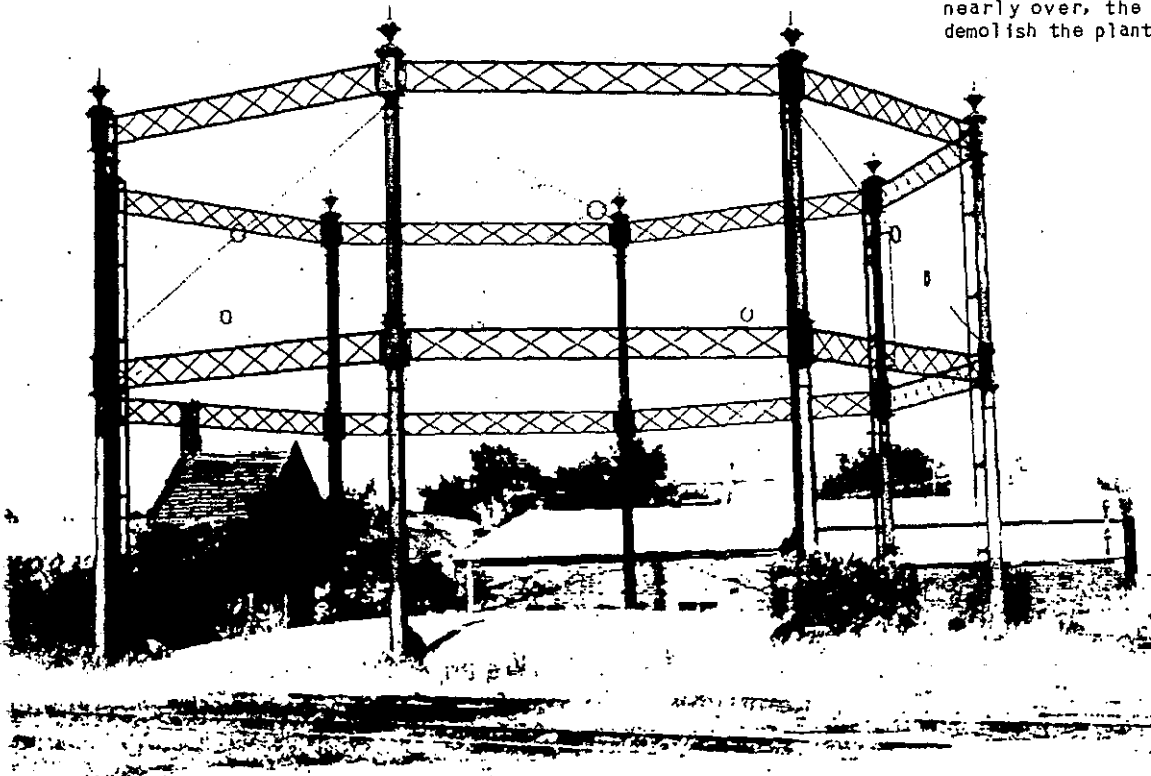
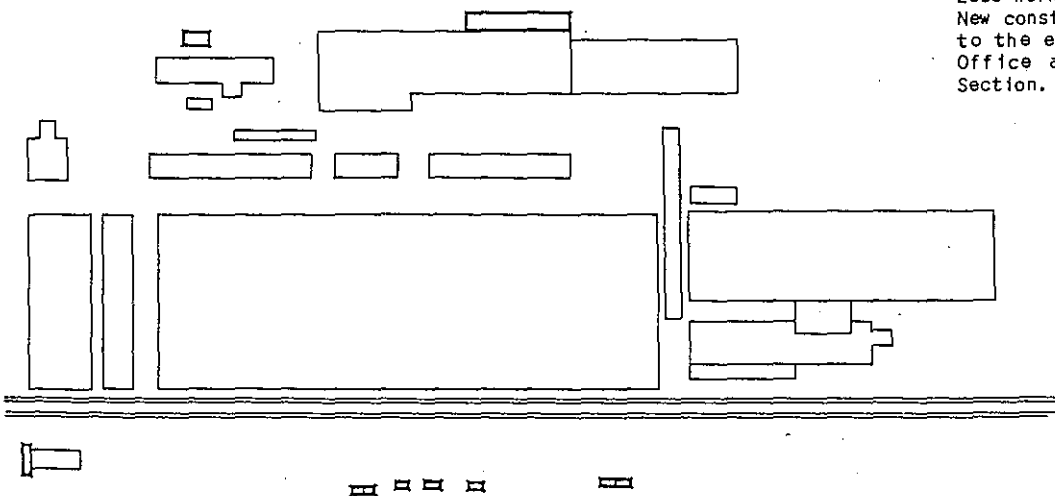


Fig. 60

Loco Workshops : Site Plan - 1950
New constructions since 1930 are limited to the extension of the Works Managers Office and the new Foundry Amenities Section.

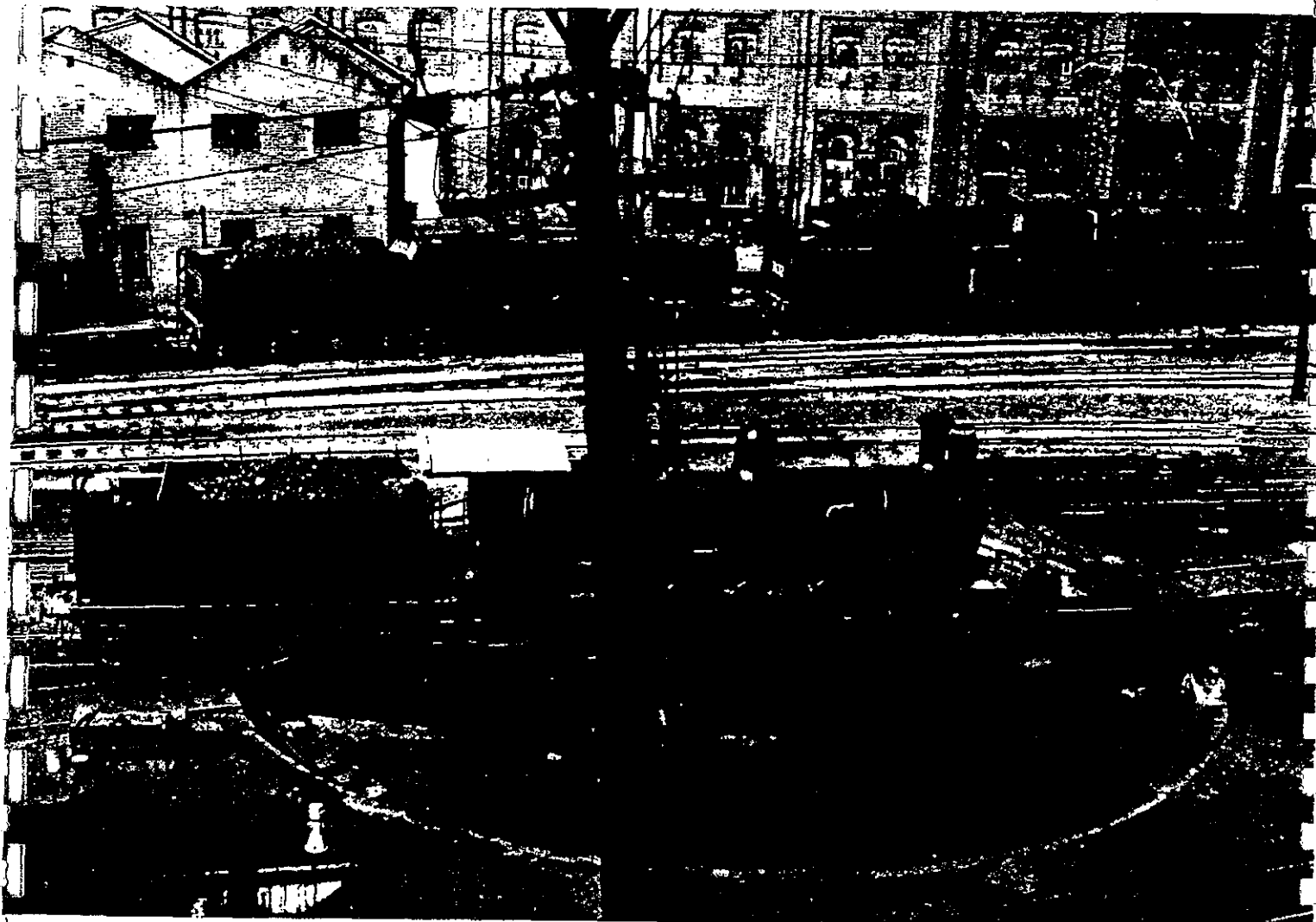


A summary of the history and operations of Eveleigh Workshops prepared by the office of the Works Manager in 1955 provides a good indication of the level of production in the Workshops for this period, perhaps its peak level prior to the introduction of diesel locomotives which led to the downgrading of operations at Eveleigh.

Fewtall, F., Works Manager, 14/5/55.

At that time, the Eveleigh Workshops was overhauling 239 locomotives annually. The three foundries were producing 525 tons of non-ferrous castings, 412 tons of steel castings and 7,717 tons of iron castings per year. The Spring Shop was manufacturing and repairing 33,200 locomotive, carriage and wagon laminated springs and 25,500 engine and wagon coiled springs per year, a total of 2,000 tons of metal work. The Machine Shop, occupying seven bays of the Workshops, provided 7,000 separate items per year in addition to the milling and machining of parts for the repair of locomotives. The two boiler shops were repairing an average of 94 boilers per year. Electric motors were driving most machinery around the shops with a total available power of 8,691 horse power and the total staff employed around the works averaged 3,000.

Fig. 61. Locomotive Running Shed, Locomotive Turntable. There were at one stage three of these large turntables around the workshops, large enough to carry a locomotive with tender. One remains in the south-west corner of the site, used in conjunction with the sand-loading facility. (D 34)



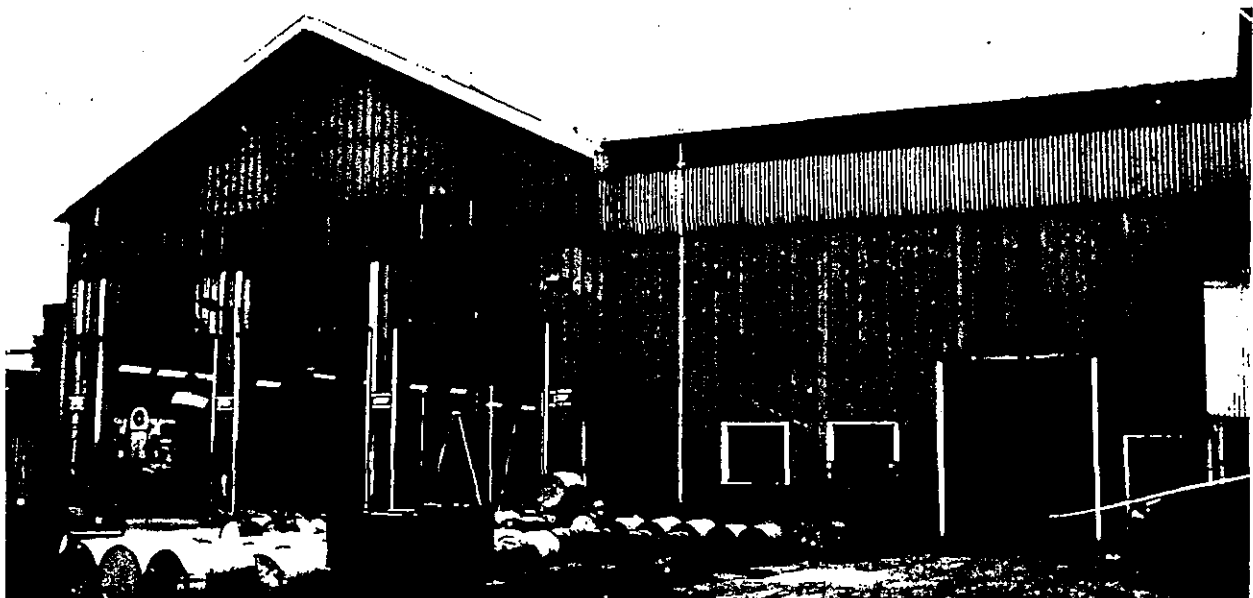
The 1950's and 1960's brought a new era to the railways with the introduction and re-equipment with large diesel locomotives leading to, by the middle of the 1960's, the complete abandonment of steam locomotion. Due to Eveleigh's historical place as a steam locomotive workshop and the lack of available space on the site for additional facilities, diesel construction, maintenance and repair facilities were erected at other workshops, with Eveleigh continuing to service steam locomotives until the change over was complete. Coincidental with this was the development and re-equipment of the electric train and carriage fleet with the now familiar air-conditioned cars.

As the steam locomotive fleet was gradually reduced in size during the late 1950's, the operations of the workshops decreased and the spare garaging space in the Running Shed, used almost exclusively for steam locomotives, increased. In 1962, the southern of the two remaining bays of the Running Shed was demolished to make room for a new building to house a repair depot for air-conditioned cars. Known as ACDEP, it was a steel framed pressed-aluminium clad building of two bays, completed in June, 1966.

Wylie, 1963, in A.R.H.S. Bulletin 291-314, p.945.

The last passenger service in N.S.W. to be hauled by a steam locomotive ran during 1963. Where appropriate, the steam locomotives were then used to pull goods trains and for shunting and yard services, otherwise they were disposed of. In 1964, the Boiler Repair Shop located in the former foundry on the north side of the Large Erecting Shop was dismantled and the building was remodelled as a Diesel Locomotive Service Depot. This was completed in June of that year.

Fig. 62
Loco Workshops - Diesel Loco Servicing Depot
The Boiler Mounting and Repair Shop, built in 1899 as the Foundry, was demolished in 1964 to make way for a shed in which Diesel Locomotives were housed while routine service and maintenance was undertaken.



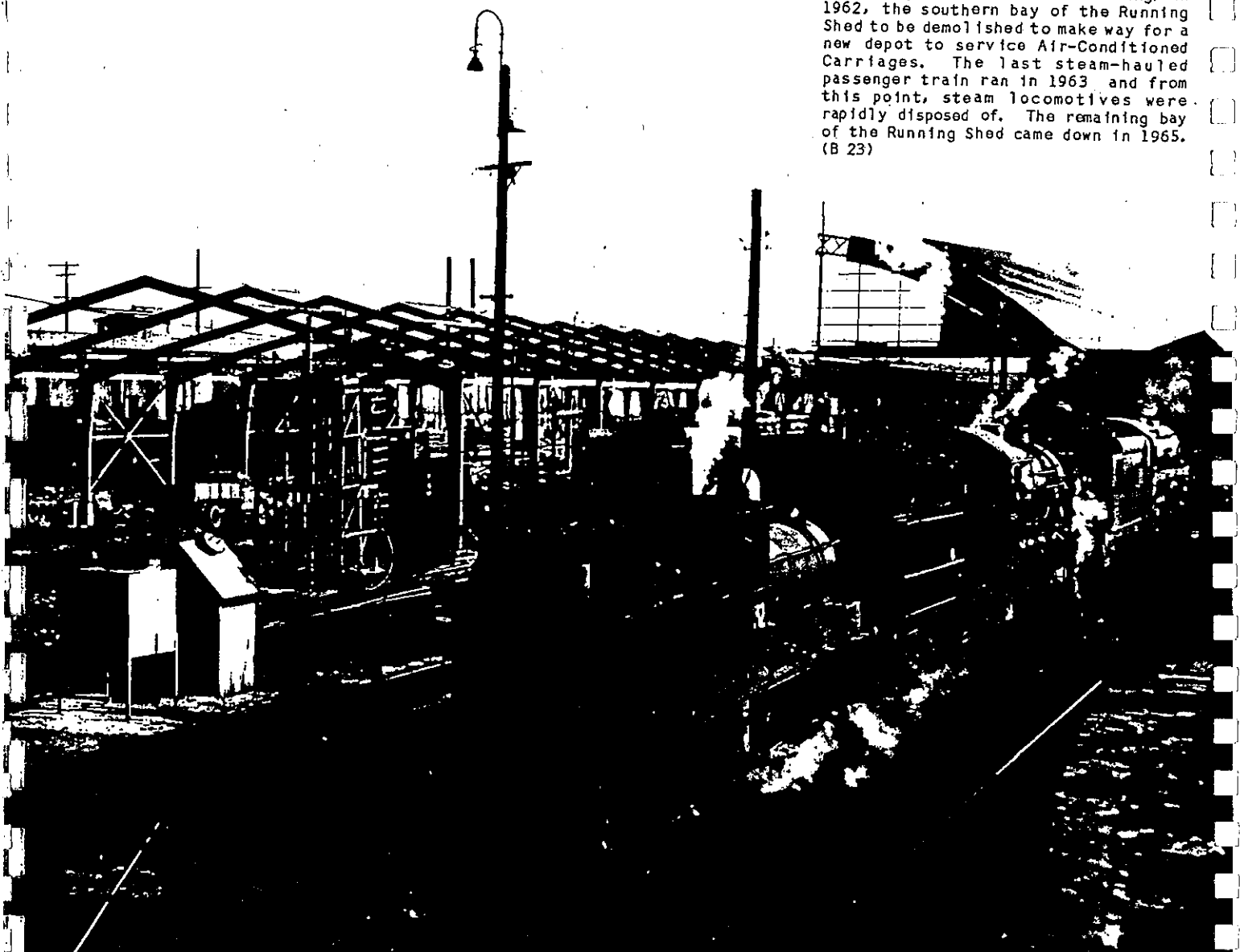
In 1965, the remaining middle bay of the Running Shed was demolished as all steam locomotives had been either disposed of or moved to other depots and the space was required for alterations to the yard layout in this area. In August a new stores and amenities block was constructed on the north side of the Large Erecting Shop, adjacent to the recently created Diesel Loco Servicing Depot.

During 1966, at least one if not both of the Babcock-Wilcox boilers in the Compressor House was taken out of service. In July, 1967, the elevated coal stage was demolished, its service no longer required. When demolished, it was noted that the all timber structure had survived the forty years of duty with little deterioration either in its structure or the condition of the timber. In 1969, an annexe was constructed on the west side of the Diesel Locomotive Servicing Depot.

N.S.W.R. Workshop Conference, August, 1966.

E.W.C.S.C., 1968, in Eveleigh News, No. 377.

Fig. 63. Locomotive Running Shed, Demolition.
Steam trains were being gradually phased out during the late 1950's, enabling, in 1962, the southern bay of the Running Shed to be demolished to make way for a new depot to service Air-Conditioned Carriages. The last steam-hauled passenger train ran in 1963 and from this point, steam locomotives were rapidly disposed of. The remaining bay of the Running Shed came down in 1965. (B 23)



**EVELEIGH WORKSHOPS
HISTORY AND DEVELOPMENT
1970 - ADAPTING TO A NEW AGE**

By the early 1970's, the change in the Eveleigh Workshops from a central and fully equipped railway workshops capable of all aspects of construction, maintenance and repair of steam locomotives to an old complex of engineering shops filled with aging and obsolete equipment ill-suited to the requirements of the new railway technology was apparent and various rearrangements and re-equipment were made to update the works.

The Foundry was updated by the purchase and installation of an automatic high volume production moulding plant in conjunction with an induction melting facility. The emphasis of work performed changed to the high volume production type castings rather than the traditional jobbing work and examples of the types of items now manufactured included brake blocks, signal components, centre castings and suspension bearings.

Lyons, Fisher, 1985.

The New Loco Shop was converted to a Rail Motor Engine maintenance and repair shop. The Spring Shop was expanded to occupy the adjacent Steam Hammer Shop and the Oliver Shop was converted to Staff Amenities and a Production Store. The Blacksmiths remained in Bays 1 and 2. Bay 3 contained a Hot Spring Coiling Section in its northern half and a Heat Treatment Plant 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. The Large Erecting Shop was separated into its two bays with the northern bay concerned with the repair of bogies and the southern with the repair of locomotives.

Plan: Locomotive Workshops, Eveleigh No. L.W.E. 3-11777, 28/11/84.

The main responsibilities of the Workshops now are for classes 44, 45, 80, 85 and 86 locomotive bogie overhauls, rail car engine overhauls, component manufacturing and repair to support branch programmes, foundry, machine shop, blacksmith and boilermaker activities and the overhaul of the 73 class shunting locomotives.

Lyons, Fisher, 1985.

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The N.S.W. Railway Workshops at Eveleigh.

A STATE ENTERPRISE.

these days of social reform and industrial unrest, the public read of countless schemes proposed amelioration which ever and anon are projected on behalf of the toiling masses, and all of which, their propagandists claim, are capable of adjusting the differences which have been growing up between Capital and Labour ever since these twin forces were first separated by human ambition and discontent. Of these many schemes, State Socialism is probably one of the most favoured by advanced thinkers in Australia, and, in the railway workshops at Eveleigh the people of New South Wales have a particularly happy

smoking carriage, ever bestow a thought on the outlay of capital, skill, and care expended in order, that he may travel in comfort and security? Does the gay excursionist, travelling his 160 miles at 'single fare for the double journey,' never wonder how it is done? Or the trans-continental tourist, who travels from

magnitude of the operations which are carried on there. The railway workshops were removed from Redfern to Eveleigh in 1887. The old shops were on a very small scale, and proved utterly inadequate to the demands which were made upon them; it being, indeed, stated at the time of the removal

of the Locomotive Department, which is subdivided into the engineering and the carriage departments. The former is under the management of Mr. H. B. Howe, and the latter of Mr. Elston, both being, of course, subject to Mr. W. Thow, Chief Mechanical Engineer and head of the department, whose portrait we give.



W. Thow, M.B.M. Inst., C.E.
Chief Mechanical Engineer.



The Turning and Machine Shop.

Illustration of this principle at their very door. For here is an undertaking in which the State, as an employer, eclipses and overshadows all private contemporary enterprises—an industry in which the State employs 1548 artisans and skilled workers, to whom it pays, roughly estimated, wages amounting to £220,000 per annum, while it distributes, probably, double this amount to a host of producers of raw material of every class and kind.

Does the weary brain-worker, whittled from his city career towards the Blue Mountains, while seated in a first-class

Abelaide to Brisbane in something like 72 hours, does it never occur to him how marvellously the railways of this country have been developed? These are a few of the thoughts which crowd into the brain of the visitor to the Eveleigh engineering shops, as he gazes in amazement at the

to Eveleigh, that there were twenty years' arrears of work! With the scope and verge afforded at Eveleigh, however, the operations are expanding every day. The workshops and yards occupy sixty-six acres of land, over eleven acres being under cover. This is the headquarters

Mr. Thow was at one time an articled pupil of Sir John Fowler, of London. After having considerable experience in England, he entered the service of the South Australian Government, which he left only on his appointment to his present post.

The engineering department is most interesting, and, for the perfection of its inventory and appliances, its equal is not to be found in the Southern Hemisphere. In No. 1 smith's shop, 150 mechanics are employed. Here, all the heavy forgings are made for renewals and repairs. Seven-ton hammers, ranging in power from 200 cwt. to forty cwt., work multifarious devices out of shapeless masses of heated iron, their strokes varying from a gentle cat-paw-like caress, to a concussion like a thunderbolt. Here, also, are three large furnaces, two of them working in conjunction with the steam hammers for utilising scrap iron, and the third being employed in heating the tips of carriage and wagon wheels. Just outside the shop, stands a large covered rack of iron and steel, containing some 150 tons, where it is gratifying to see the local iron (Blackbank, New South Wales), very much in evidence. The operations in this shop are very interesting, take, for example, the manufacture of coupling-hooks. In this, the raw material is worked up out of scrap iron, prepared in shapes, and stamped out, in a pair of dies, by a blow from the forty cwt. steam hammer. The hook is then passed on to another hammer, where the shank is drawn out; thence to a blacksmith, who trims and finishes it off; all this being accomplished without re-heating. In a shed to the rear stands what is known as the 'case-hardening' furnace. Iron manufactures which require special strength and durability, are placed in this furnace, and baked with bone-dust and certain chemicals for twenty-four hours. This process 'steels' the surface of any iron-work so treated. A Roots' patent blower—the bellows of ninety smiths' fires in the



Sawmill and Carriage Shop.

and foundry—completes the equipment of the first section.

Passing on to No. 2 smiths' shop, we find the spring-makers and repairers. Here are furnaces for heating plates for setting and tempering, and a spring-testing machine. The carriage and waggon spring-makers have each day's work tested the following morning, every spring being submitted to a severe trial before being placed under any vehicle. While undergoing the test, the springs are straightened both by a steady strain and by violent jerks, so that they are tried under circumstances quite equivalent to railway traffic. In this department is another extremely valuable testing machine. This is for ascertaining and registering the various strains at which iron will break. The hydraulic testing power of this machine is 100 tons to the square inch, and, naturally, its services are most valuable in testing draw-axles, couplings, etc. For example, if a private firm supplies the Railway Department with a quantity of forged work, couplings, hooks, etc., a sample is tested by this machine which, while tearing the forging to pieces, registers at how many tons strain it lengthens, cracks, and finally breaks. Under such a toll-like system of testing as this, no defective material or work can possibly pass. Another hydraulic machine in this department is for removing spring buckles, and is also ingenious and valuable. Here are also machines for slotting and drilling, for nibbling, studding, and slotting, and for shearing the ends of the springs; a machine for bending links for coupling chains, a machine for punching links for connecting the springs to the vehicles (these are punched out of red-hot iron, the link being formed in the figure eight, and two holes punched at either end with one movement); a machine which makes iron bolts by a process which only occupies a few seconds; a machine which cuts up cold steel as if it were cheese; a revolving saw which cuts through red-hot iron at a great speed; two "chippers" for making ferules, etc.; a spring hammer, and four gigantic steam hammers. In the five smiths' shops which have been seen traversed are forty-two fires, in addition to the furnaces, and Mr. Howe claims with pride that "there is nothing equal to this department out of England." Improvements are being constantly made, and the equipment of machinery and tools is all that the heart of the mechanic can wish.

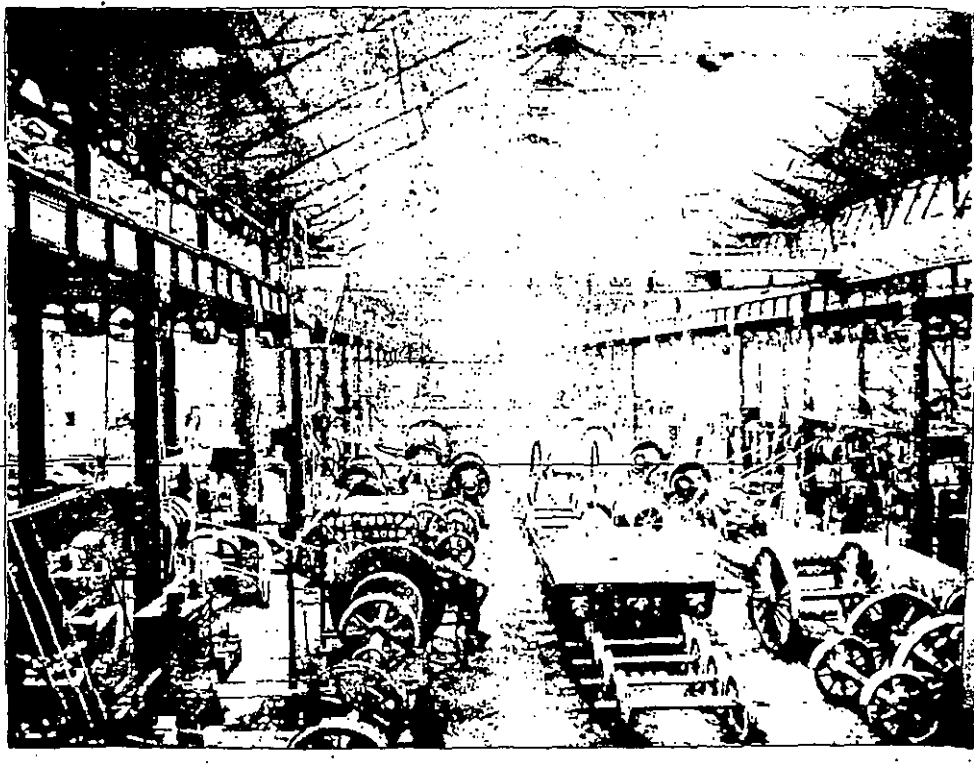
The next step is to the boiler shop, where the locomotive boilers are taken to pieces, renewed as required, and thoroughly repaired. This branch, under the management of Mr. Fernleigh, affords employment

to 160 men. Seventeen locomotive boilers were in hand at the time of our visit. Among the more notable of the appliances in this shop are: A Tweedles' hydraulic rivetting machine, six ordinary and two special forges, the latter for heating boiler plates; Stowe's flexible, drilling machine, driven by a cotton rope and extending half the length of the apartment—this machine may be attached to any boiler within its

largely carried on. The other machine tools are: A radial drilling machine, two punching and shearing machines, steam driven, in addition to a large hydraulic machine of the same class—the latter can shear or split a 7ft. plate; a machine for boring along the edges of wheel flanges, a set of circular shears; drilling, screwing, and planing machines—the latter shaves off uncouth curls of cold steel, iron, or

and boiler shops by double cylinder wall engines, of twenty horse-power nominal, and two boilers of the locomotive type, which drive all the machinery. A pair of hydraulic engines, thirty horse-power, work the accumulator to supply the hydraulic machines.

Passing on in the natural order, the visitor next inspects the brass and iron foundry where, with Mr. Ellis as foreman,



Turning and Wheel Shop.

radius in which holes have to be drilled, and is also used for tapping and screwing in the stays of boilers anywhere in the shop without necessitating the removal of the boilers. One considerable feature in the renovation of boilers, is the substitution of copper plates for the worn out steel ones in the American engines. This is being

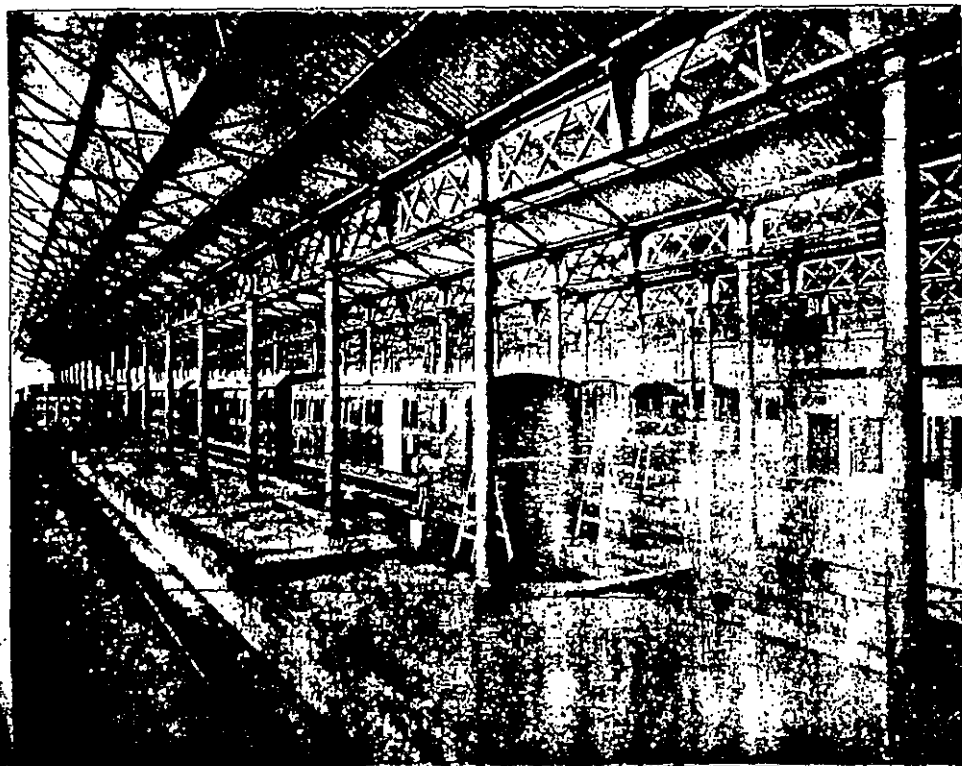
copper with the greatest ease; a hydraulic machine and two sets of special rollers for bending plates, etc. In common with the other shops the boiler shop has a lift-ton overhead travelling crane, which transports the work up, or down, or backward; or forward at the operator's will. The motive power is supplied to the smiths'

sixty-six moulders, assistants, and apprentices are employed. Here castings, brasses, and fittings for the complete railway system of New South Wales are made. The output from the foundry during the month preceding our visit was 113 tons of iron and 15 tons of brass castings. The copper-smiths' and tin-smiths' shops, with thirty-seven workers, come next. Here all lamps, pipes, oil-bottles, feeders, etc., are made and repaired.

Four large divisions are used as erecting shops, and are under the control of Messrs. Scott and Atkinson, foreman and assistant foreman respectively. This is the hospital of the steam engine, which makes its start in life from here, returns from time to time for repairs during its career, and comes back finally, when worn out, for dismantlement—the locomotive's death. At the time of our visit, thirty-seven engines and tenders of all sorts, ages, and sizes, were undergoing repair at the hands of 215 busy fitters and assistants. Overhead, a twenty-five ton travelling crane ran up and down, lifting the largest engines from place to place as though they were but feather weights. In this branch, too, new engines from Great Britain—portion of a large order then being executed—were being erected by fitters from the manufacturer's workshops.

The turning shops, with special lathes, slotting and drilling machines of the latest type, also present much to interest the visitor. Here, Mr. Greenfield, the foreman, employs 127 men. It is here that the Westinghouse brakes and their pumps are attended to. A pattern shop, with twenty hands, in charge of Mr. Garner, and a large store for material complete the engineering block of buildings, of which faithful illustrations are presented.

A little further up the yard stands the running shed—the stable whence the locomotives set forth on their daily or nightly runs. Some eighty-four cleaners and fitters are employed here. The duty roster for the engine drivers and firemen is kept in an office in this shed. The running shed, we were pleased to learn, serves as a sort of technical school for the training of engine drivers, many of the best drivers on our lines having been



Carriage Painting Shop.

cleansers in the running-shed. The possibility of advancement is naturally a premium to industry, among the cleaners; and the department, by this system, obtains a splendid class of men, whom it can trust from having an intimate knowledge of their whole careers.

A few steps across the line to the south side bring the visitor to the carriage branch, where new wonders of marvellous machinery and ingenious workmanship await him. Under the kindly guidance of Mr. Elston, it is quite possible to spend a very pleasant and profitable day in looking over the operations entrusted to his care. First to be seen is the paint shop, whence emerge the carriages glittering and gay, to provide accommodation and pleasure for the public. Here vehicles of every class may be seen, from the roomy sleeper or palace dining car to the unpretentious goods wagon or ballast brake. No fewer than 100 men find employment in the paint shops, and probably twice the number in the carriage-building shops further along. In the latter, the wood-working machinery is as wonderful in its way as the iron-working machinery on the other side. Everything is worked on a system; there are no idle hands; no confusion; nor is there anything that might be termed

laborious work; everything is done by machinery, at a speed, which, to the uninitiated, seems magical. Here the mallet and the chisel, the plane and the hand-saw of the carpenter find no place—mechanical science has utterly supplanted them, and machinery now performs their functions with un wavering integrity and precision, and at fifty times the speed. In the carriage shop large numbers of vehicles are undergoing renovation, and new waggons are being turned out at the rate of about ten per work. At the far end of these shops a spacious store contains the ironmongery and upholstery ma-

terials employed in carriage-building.

Taking them as a whole, there are many lessons to be learnt in a visit to the railway workshops at Eveleigh. A thorough inspection of them would occupy at least a week, although my cursory glance was accomplished, with some little difficulty, in one day. Probably one of the most striking features of the place is the careful organisation of the labour. There are no idlers, and nobody has time to waste work in order to gaze curiously at visitors. Operations go on day after day, and month after month, an unbroken chain of industry. As will have been inferred, the bulk of the work is done

by machinery. The 1648 employees supply the guiding intelligence and the attendance. The machinery cannot speak, but it can do everything else. As to the condition of the workers, it must undoubtedly be a happy one. With short hours (eight hours a day), fair remuneration, intelligent occupation, and exceedingly comfortable workshops, what more can the workman desire? Here is supervision, certainly, but it is not carried to any objectionable extent; nor does such appear to be needed. The men are a superior class of workers, and look independent and comfortable. For a large model industry, engaged on profitable lines, we do not know where to look for a happier illustration than the workshops at Eveleigh.

Mr. H. B. Howe, Manager of the Engineering Department, entered the Government service in 1904, and worked his way up through all the grades till he held the position of Foreman of Works under Mr. Whitton. In 1903 he was transferred to the Locomotive Branch of the Railway Department, as Assistant Locomotive Engineer. After some years' service he returned to Eveleigh under the Commission to take the position of Works Manager, which he now holds.

Our illustrations are from photographs by Kerry and Co., Sydney.



Mr. H. Howe,
Works Manager.

SOME AUSTRALIAN WOMEN:

(Continued.)

(By M. HIRST BROWNE.)

PART VII. PHILANTHROPISTS.

Live, but by no means least, come the noble hand-to-hand workers in the great harvest field of humanity. So long as

she has shouldered the task of rescuing the hutsam and jetsam of humanity, those orphaned, and worse than orphaned, little ones who, but for such workers as she, would be left to die in the gutters, or to live and swell the tide of crime which ever ebbs and flows between the dens and

sition, but, feeling it incumbent upon her to do so, she carried out her purpose, and, with two or three friends, commenced monthly meetings in the very heart of the slums. Since then she has been joined by other helpers, and the work prospers. The Mission Hall is thrown open at ten

either, the local deaconess of this mission.

"Will Australia develop a worthy National Character?" was the subject of a paper discussed with much vigour and warmth, but there was one momentous phase of the question which was not

CURRENT OPERATIONS AT EVELEIGH WORKSHOPS (MAY, 1986)

LOCOMOTIVE WORKSHOPS

The Locomotive Workshops at Eveleigh no longer perform work of the quantity or the diversity of its former years as the centre of steam-locomotive repair and maintenance in N.S.W. Present operations largely centre around its role as a heavy engineering works and high-volume production moulding plant, with ancilliary specialist departments carrying out their traditional functions where these continue to have a role in modern component manufacturing. Other areas now house or have been modified to house functions relating to modern railway components. Current operations at present are subject to some degree of continual change as the railway managers endeavor to maximise the efficient utilisation of available resources for the ultimate smooth functioning of the railway system.

The locations and designations in the following list relate to Site Plan No. L.W.E 3-11777, dated 26/11/84 and as amended on 1/8/85. Operations are as performed on 16/5/86.

ENGINE SHOP

All repair or reconditioning of a diesel motor or any of its component parts is carried out in this shop. The motors are rail car engines from 600, 660 and 900 class rail cars, XPT locomotive engines and air-conditioned van power-car motors and any other diesel motor as may be required. Most types of motors and representatives of most major manufacturers in the diesel field including Rolls Royce, Cummins, Perkins etc are repaired and overhauled. The tradesmen in this shop are all Fitters and Machinists.

BLACKSMITHS SHOP (BAYS 1 AND 2)

This shop performs all hot-forgings of any nature as required. Today, much of the work formerly performed by blacksmiths is die-cast or drop forged but many pieces still have to be hand forged. Typical items created are locomotive bogie equalising beams, brake equipment, travelling crane wheel tyres and specialised tools. Products may be passed on direct to the consumer department or may be sent to the heat treatment section or the machine shop (particularly if not die-cast) for further treatment. Tradesmen employed are all Blacksmiths.

HEAT TREATMENT SECTION (BAY 3)

This shop performs all the annealing, case-hardening, hardening and tempering of metal items as required. Material generally comes from the blacksmiths shop or from the machine shop. Heat-treatment is usually a final process and completed items are generally sent direct to the consumer department. Common items treated are the pins and bushes for brake equipment. All tradesmen are blacksmiths.

SPRING SHOP (BAY 3)

Although not as extensive as previously the spring shop remains the only spring section within the N.S.W. railway system. The manufacture and repair of all large springs used on all vehicles - locomotives, carriages and waggons - by the NSW SRA is performed here. The major portion of work is the manufacture of large coil springs and as subsequent failure of these items is rare, repairs to these are limited to occasional retempering. The manufacture and repair of laminate springs is secondary but regular work. Tradesmen employed are elevated blacksmiths, trained within the section.

FABRICATION SHOP (BAYS 4 AND 4A)

Also known as boiler repair, this shop performs all boiler repair work that may be required. Boilers are almost exclusively of the stationary type nowadays, however the occasional steam locomotive restoration work is undertaken. In addition, any manufacture of metal plate items formed from metal plate greater than 10 gauge (1/8 inch or 3.2mm) such as truck body parts, hopper doors for wheat waggons, metal steps and similar items is carried out in this area. The tradesmen employed are boilermakers.

FITTING SHOP (BAYS 5,7,8 AND 9)

This shop performs all work necessary to wheels and axles, especially the fitting, grinding and polishing of bearings and journals. It is also responsible for the repair and overhaul of the brake air-compressors used on modern carriages and waggons. Tradesmen employed are fitter/machinists.

MILLWRIGHTS (PART OF BAY 6)

This shop is staffed by specialist fitter/machinists and is responsible for the installation, maintenance and repair of all forms of tools, machines and cranes in the workshops. On occasion, this department may manufacture a machine to particular railway requirements. Adjustment, calibration and modification of machinery is also performed as required.

MACHINE SHOP (BAYS 10,11 AND 12)

This shop performs all the drilling, milling, turning, planing and grinding work required in the workshops. Any work requiring the operation of machine tools is performed and the subject material is related to the activity of other shops in the works. Some work is performed for other railway workshops for either load-sharing or specialist

equipment reasons. The machines in use vary from 19th Century pieces installed at the opening of the workshops to the most modern available. Tradesmen are of course fitter/machinists.

TOOL ROOM (PART BAYS 13 AND 14)

This shop is a branch of the machine shop and manufactures, maintains and repairs gauges and tools of all varieties for use around the workshops and other sections of the Mechanical Branch. It is also responsible for very high precision machining work as required. It is staffed by specialist fitter/machinists.

AIR BRAKES SHOP (PART BAYS 13 AND 14)

This section is responsible for any and all work required in the manufacture, repair and maintenance of the air-brakes fitted to modern rolling stock. Staffed by fitter/machinists.

RAIL MOTOR TEST ROOM (PART BAY 15)

Rail Motors repaired and reconditioned in the Engine Shop are brought to this shop for fitting-up, testing and tuning prior to being fitted to the rail cars.

LARGE ERECTING SHOP

Locomotives, rail cars and power vans requiring major repairs, reconditioning or work to bogies are brought to this shop and disassembled using the heavy-lift cranes and jacks as required. Parts are repaired or replaced from other shops in the works and sent to this shop for reassembly. This work is separate and in addition to routine maintenance.

DIESEL LOCOMOTIVE SERVICE DEPOT

This depot houses all regular service procedures for diesel locomotives. Items typically serviced include oil and water supply, brakes, bearings and electrical components.

FOUNDRY (INCLUDING IRON, STEEL AND NON-FERROUS)

This section is responsible for the melting and casting of all ferrous and non-ferrous metals required for use throughout the workshops and for the railway system. Primarily an iron-melting plant, in recent years automatic high-volume production moulding plant has been installed in the foundry, producing items such as brake blocks, signal components, centre castings and suspension bearings. Some jobbing work is carried out as required. A core-making section is provided for the supply of both jobbing cores and high-volume production type cores. All scrap iron and steel is provided from within the S.R.A. and most non-ferrous scrap also, with the exception of leaded-bronze and aluminium which is purchased outside. At present, in excess of 5000 tonnes of iron castings, 200 tonnes of non-ferrous castings and 100 tonnes of steel castings are produced annually.

PATTERN SHOP

This fully equipped pattern shop manufactures the timber patterns for all kinds of castings produced in the adjacent foundry. With the present emphasis on high-volume production items, operations are less than they once were but sufficient jobbing work occurs to maintain a regular activity. A large storeroom below the shop stores the patterns for future use as they are required.

TINSMITHS SHOP

This shop houses the operations of the tinsmiths, or sheet-metal workers as they are now known. They are responsible for the manufacture and repair of items fabricated from metal plate of a gauge less than 10 (1/8 inch or 3.2mm) as may be required.

COPPERSMITHS SHOP

This shop houses the operations of the coppermiths. They are responsible for the repair and maintenance of items fabricated from copper. Typical items attended by the coppermiths include fuel and air lines, tanks and radiators for diesel locomotives.

PLUMBERS. SHOP

This shop houses the operations of the Plumbers for the workshops. They are responsible for the installation, repair and maintenance of water, sewerage and gas services, roof work, guttering and downpipes of all forms around the workshops.

CURRENT OPERATIONS AT EVELEIGH RAILWAY WORKSHOPS

CARRIAGE WORKSHOPS

At the time of the writing of this report, the operations at the Carriage Workshops were being reviewed and reorganised and most of the traditional activities were in the process of being abandoned. One section of the works was being rebuilt as a maintenance depot for the Suburban electric rail cars and when completed, a major part of the operations of the Carriage Workshops will be centred around this activity.

As the present situation is one stage in a process of change whereby most activities carried out in the past are being replaced by activities relevant to the modern railway rolling stock, a comprehensive description of the individual activities cannot be provided at this time.

lished in consequence of 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 600 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-tying 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 repairs. These shops also contain ordinary smiths' fires and special forges for dealing with the flanging of plates and angle-iron work, and are equipped with two over-head, rope-driven, travelling cranes, which run the full length of each shop, one of 10 tons capacity and the other 16 tons. Compressed air is also used for working portable tools, such as drills and pneumatic hammers.

Nos. 5, 6, 7 and 8 Shops are used as erecting shops and contain pit and bench accommodation for dismantling, repairing and erecting engines. They provide sufficient accommodation for 24 engines and tenders. A ground traverser is used for taking the engines in and out of these shops from the lines of rails outside the main buildings. Twenty-five-ton overhead travelling cranes run over three bays. These and sundry machines are driven by a pair of 50 horse-power wall engines.

Nos. 9, 10 and 11 Shops are used for machine work and equipped with heavy wheel duplex and axle lathes, tyre-boring, drilling, and spindle-boring machines, modern capstan lathes, special lapping machines, boring machines, and heavy milling tools, both vertical and horizontal, for dealing with foundation rings and all heavy work for new boilers, etc.; three small horizontal and vertical milling machines for general work, slide-bar and stool grinding machines, brass finishers, lathes, piston rod grinding machine, large gap lathes, and numerous smaller lathes ranging from 16 to six inches centres for general work, cylinder boring machines, and the usual heavy planing, shaping, slotting, and radial drilling machines, nut tapping, general and special screwing machines used in first-class locomotive works. There are two hydraulic presses, ranging from 200 to 750 tons in these shops. Air hoists have been introduced, and are used, operated over heavy lathes and other machines, for lifting the work in and out. The whole of the machinery in these shops is driven by a pair of 50 horse-power wall engines. A large tool store, containing small 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 recently been ordered for these workshops, such as special milling 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 interlocking work which it is intended to remove from Redfern to Eveleigh.

No. 14 Shop is occupied by pattern-makers and carpenters. It is equipped with wood-turning lathes, saw benches, planing machines, and all necessary appliances 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 Store 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 forwarding 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 and 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 has recently been installed in an annex of the boiler shop.

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 Erskinville for the purpose of cleaning carriage cushions, carpets, etc.

There is also a large hydraulic plants with accumulator, weighted to pressure of 1400 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-ton 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 overhead 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 southern 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 Billilindra, 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

Railway and Tramway Musical Society.

ONE of the best concerts the above Society has ever given took place at the Institute on the 19th ult., when the proceeds were on behalf of the Indian Famine Fund. Unfortunately the weather was very unpropitious and interfered with the attendance. The programme was a well diversified one, including instrumental items from the Society, W. J. Stent's Bango Club together with solos by Messrs. J. F. Truscott, Mrs. G. Leeder, Miss Lalla Ross, Mr. Edward Jenkins, a recitation by Mr. Orchard, a lightning sketch by Mr. F. A. Büttler, a duet by Messrs. Sherlock and Cochran. The whole of the soloists were very successful in their efforts, Mrs. Truscott's beautiful contralto voice being heard to considerable advantage, while Mrs. Leeder and Miss Ross were greatly appreciated, the latter singing "Neath My Lattice," from the "Rose of Persia." Mrs. Bissell accompanied in her usual sympathetic manner, and Mr. Sherlock occupied his usual post as conductor.

Children's Entertainment.

THE third of this series of entertainments was held on 24th ultimo, and was, if possible, even more successful than the previous ones. Masters E. Atkinson, J. Laidlow, S. McEvoy and F. Ellis secured well-deserved encores for their songs, and Miss Amy House was recalled for her display of skirt dancing. Master Sedley showed himself a master of the banjo, while piano solos were excellently rendered by the Misses Murphy, Atkinson and Ruwald. Miss E. Thomas recited, while songs were acceptably rendered by the Misses Ellis, Ruwald and Laidlow, and a sand-jig by Miss Ellis was much appreciated. Dum-bell exercises by Public School pupils, and a display of Indian Clubs by a team of young ladies, afforded excellent proofs of the poetry of motion. The performances throughout were of a very high order of merit, and the crowded audience, both young and old, spent a very happy evening.

The Carriage and Wagon Shops at Eveleigh.

FOLLOWING the interesting description of the "locomotive side" of the workshops at Eveleigh, which appeared in last issue, we publish hereunder a brief description of the Carriage and Wagon, which as mentioned are situated at Eveleigh, almost opposite the locomotive shops, but on the other side of the railway line. The buildings are necessarily extensive in view of the large stock of carriages and wagons required to conduct the traffic of such a large concern as the New South Wales Railways, and it is not surprising, therefore, to find that in these shops employment is afforded to over 520 men.

The main building of the Carriage and Wagon Shops consists of ten bays, each 300 feet long and 60 feet wide, and this arrangement is as follows:—

SHOPS No. 1, 2 AND 3, are devoted to the repairs and re-building of wagons, and the construction of new wagons. There are 15 roads, each providing sufficient accommodation for 70 4-wheel vehicles. A ground

traverser is used for taking the wagons in and out of the shops from roads outside the main building. There are two 12-ton overhead rope-driven travelling cranes, each running the full length of shops No. 2 and 3. SHOPS No. 4 AND 5, are used as a saw mill. They are equipped with modern machinery for dealing expeditiously with the preparation of all timber required in these shops. The machines consist of saws, planing, moulding, tenoning, boring and shaping machines, a chain saw, mortiser, sand-papery machines, saw sharpeners, grinding machines, &c. In all, there are 47 machines in the mill. No. 5 shop also contains the boilers and two pairs of 50 h.p. wall engines which drive the whole of the machinery in these shops.

No. 6 SHOP, is used as a smith's machine and fitting shop. It contains 11 smith's fires, two small steam hammers, a punching and shearing machine, and a bolt making machine with furnace; also lathes for wheel turning and general work, shaping, drilling and screwing machines, and a duplex automatic screwing machine. The shop is equipped with a 5-ton overhead rope-driven travelling crane, which runs the full length of the shop. Outside this shop, at one end, is placed a plant for cleaning axle-boxes, by boiling them.

SHOPS No. 7 TO 10, are used as carriage repairing shops. There are 13 roads, with accommodation for 29 bogie cars. For facilitating the lifting and removal of vehicles, two 12-ton overhead rope-driven travelling cranes are used; they run the full length of shops No. 7 and 9. A ground traverser is used for taking the vehicles in and out of the shops from the roads outside the main building. Two new 60-ft. traversers have been ordered for the Carriage and Wagon shops; they will be driven by electricity generated at the Ultimo Power House, and will be installed outside at each end of the main building, and the space now occupied by the present traversers will be filled up, thus giving increased accommodation for the repairs of carriage and wagons. Compressed air is laid on throughout the shops, and is used for the purpose of testing brakes, cleaning carriages, and for working portable tools, such as drills, dust ejectors, &c.

A portion of No. 9 shop is used by the trimming staff, where the whole of the interior trimming material used in carriages is dealt with. Two pairs of hair-teasing machines are at work, also machines for dealing with the felt used in making axle-box lubricators. A plant has recently been installed in No. 7 shop for electroplating all the metal work fittings used in the interior of carriages. It comprises dynamo, plating vats, and vats for stripping the old silver and nickel from the fittings, also buffing and polishing lathes. Adjoining the plating room are the carriage finishers' benches, where the whole of the interior woodwork for carriages is prepared ready for fixing in the vehicles. A store is located in No. 10 shop, which is a branch of the general store, and is conveniently placed for the supply of materials for daily use in the Carriage and Wagon Shops.

THE PAINT SHOP, is an entirely separate building, off from the main shops (No. 1 to 10). It is 300 feet long by 160 feet wide, and contains six roads running the full length of the shop, and has accommodation for 42 bogie vehicles. On one side of the shop is a paint store and mixing room, fitted with paint mills and mixer which are driven by a small engine. A room in which women are engaged in upholstering work is placed on the other side of the shop, and contains four sewing machines, ball, cloth and leather used for cushions and trimmings for