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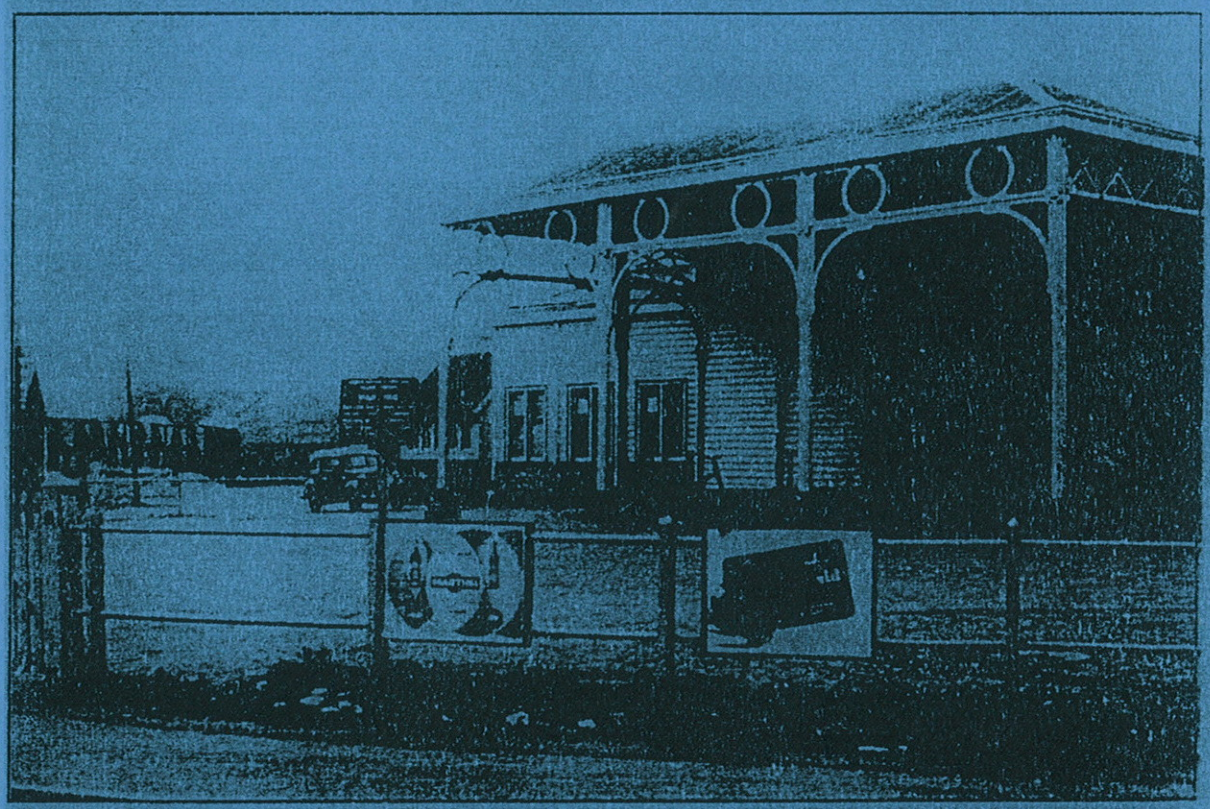
FORMER LMS STATION
REWLEY ROAD, OXFORD

ARCHAEOLOGICAL INVESTIGATION



OXFORD ARCHAEOLOGICAL UNIT
MARCH 1998

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NMR DATA	
Site Name	Former LMS Station
Address	Rewley Road
Town	Oxford
NGR	SP 5062 0629
Listed Status	Grade II*
Visit/Survey Date	Sept 1997 - Jan 1998
OAU Site Code	OXLMSBS

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SUMMARY

The former LMS station at Oxford was surveyed by the Oxford Archaeological Unit to inform decisions being taken as to its future. It was confirmed from documentary sources that the building was constructed in 1851 by the engineers Fox, Henderson & Co, engineers of the Crystal Palace then being erected to house the Great Exhibition. The building brief specifically required that the station replicated the structure and appearance of the Crystal Palace, ostensibly for reasons of cost and speed of erection but apparently also for publicity purposes during a period of intense railway rivalry and unprecedented demand for railway travel to London.

Examination of the remaining part of the structure itself has revealed that whilst both the concourse and side wings are primary, and that both still contain large amounts of their original iron and timber components, virtually every one of the primary iron or wooden elements is very slightly different from its counterpart in the London building. Some of the elements are different because the layout of the elements had been changed but often the differences appear to occur to avoid various Paxton features of patents. The building is therefore very instructive in indicating which features of the Great Exhibition design were Fox and Henderson's and which were Paxton's. The survey has also revealed design flaws introduced by this process of adaptation of standardised components, most specifically in the original design of the roof. Both the concourse/trainshed and the side wings have been shown to have originally been roofed with 'Paxton-esque' ridge-and-furrow roofing which failed very early in the building's life. The replacement of these roofs led to two differing solutions to the problem of providing large-span roofs whilst retaining the top-light which the original room layout demanded.

The building appears subsequently to have been modified, in some areas several times, during the first sixty-odd years of its life, as it evolved to meet the needs of the railway and the travelling public. The fact that the building ceased to be a public railway station in 1951 and has subsequently been in light ephemeral use has meant that far more historic fabric survives than would be found in a working railway station and has left the building's archaeology substantially intact, albeit in a very fragile state. It is expected that further significant information concerning the station's origin and development remains to be discovered, in particular concerning the nature and original appearance of the external walls and the building's historic colour schemes.

FORMER LMS STATION
REWLEY ROAD, OXFORD
ARCHAEOLOGICAL INVESTIGATION

1 INTRODUCTION

1.1 The Oxford Archaeological Unit (OAU) was commissioned by Railtrack to undertake a programme of archaeological investigation at the former LMS station at Rewley Road, Oxford as part of a proposal to dismantle and re-erect the Grade II* building. The agreed survey specification is reproduced below (p.29). This survey supplies fuller detail to the outline supplied in the 'Explanatory Memorandum to accompany the Application for Listed Building Consent' (OAU 1996), and has been produced is response to requests for further information.

1.2 This work draws heavily on previous reports, notably that on the structural significance and condition of the building commissioned in 1989 by the British Railways Property Board from Building Design Partnership,[1] reports on the foundation structures commissioned by Stanhope Properties from the OAU in 1995 and 1996,[2] and the pioneering study by R.J.M. Sutherland published in 1975 in *The Structural Engineer*.[3] Copies of these last three reports are reproduced below as Appendices B-D. A detailed historical study previously undertaken by OAU is also given below as Appendix A.

1.3 As stated above, this building is Grade II* listed, having been upgraded from Grade II in December 1985 following discussions between Oxford City Council and English Heritage, and thus recognising the building's considerable historic importance (see copy of List entry below, p.30). The most notable feature of the station is its method of construction and its relationship to the Great Exhibition building of 1851, known as the Crystal Palace. The station is also a good example of mid-nineteenth century railway architecture with some unusual features. Whilst 80% of the trainshed was removed prior to 1969, the remaining sections, which includes the station concourse and offices, has remained substantially intact since 1888.

1.4 The purpose of the investigation was firstly to understand which parts of the structure were primary and to ascertain the exact relationship of the components used in the station's construction with those used in the Crystal Palace. The second objective was to determine the evolution of the structure since 1851.

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1 B[uilding] D[esign] P[artnership], *Report on Feasibility Study of the LMS Station at Oxford* (1989).

2 OAU, *Oxford Rewley Road (LMS) Station - Investigation of Foundation Structure* (1995) & OAU, *Oxford Rewley Road (LMS) Station - Investigation of Foundation of Porte-Cochère* (1995).

3 R.J.M. Sutherland, 'Oxford Midland Station and the Crystal Palace', *The Structural Engineer* (Feb 1975), No.2 Vol.53, 69-72.

2 HISTORICAL BACKGROUND

2.1 HISTORICAL SUMMARY

2.1.1. The site of the former LMS station at Oxford was originally occupied by the Cistercian Abbey of Rewley from 1287 until the dissolution of the monasteries in 1536. From then until the time of the railway expansion, the site and the ruined abbey was owned by Christ Church, Oxford, who sold the stones as a source for new buildings. As the last stones were sold, the site was passed to the railway company to build the station.[4]

2.1.2 In the middle of the last century, the expansion of the privately run railways across the country included a number of companies bidding to provide a rail link to the town of Oxford. Despite opposition from the powerful University authorities, in 1844 the Great Western Railway built a line from Didcot to a temporary station in south Oxford.[5] The Great Western then sought powers to extend this line towards Birmingham and as part of a episode of notorious railway rivalry the London and Birmingham company and its allies, under the formidable leadership of Captain Mark Huish, sought to block this advance by supporting Sir Harry Verney's scheme for the creation of the Buckinghamshire Railway, a locally-backed scheme for a series of lines through that county linking Bletchley on the L&B to Aylesbury, Banbury, Bicester, Buckingham and Oxford.[6] The system was first laid out by no less a person than Robert Stephenson. The Engineer-in-charge of constructing all the lines was Robert Benson Dockray (1811-1871) and the contractor was Thomas Brassey. Despite their backing for the Buckinghamshire scheme, Huish and his allies, who in 1847 had combined to form the London and North Western Railway (then the largest railway company in Britain), failed to prevent the GWR reaching Birmingham via Oxford, but their backing ensured the completion of the Buckinghamshire Railway. The Oxford branch was formally opened under the auspices of the Buckinghamshire Railway on 20 May 1851 however, from the outset the trains were worked by the London and North Western Railway Company, which had been formed from the amalgamation of the L&B and several other large companies in 1848. By July 1851 the LNWR had leased the lines for 999 years, providing all the engines and rolling stock and in 1879 the Buckinghamshire Railway was consolidated into LNWR.[7]

2.1.3. The LNWR was amalgamated into the London, Midland & Scottish Railway (LMS) as part of the 1922 railway grouping and in turn passed into the London Midland Region of British Railways upon nationalisation (1st January 1948). The two Oxford stations had been under the control of the GWR stationmaster since 1934 and from 1951 all passenger trains on the former LMS branch were diverted into the GWR station.[8] The platforms and sidings continued in use handling ever-diminishing volumes of goods traffic and for a short while the station was used as a hostel by goods train crews until 1969 when the building was converted to a tyre and exhaust depot. In 1969 much of the trainshed was dismantled and the front section of the porte cochère removed. On account of the building's importance, two bays of

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4 B.D.P., *Feasibility Study* (1989), 6.

5 E.T. MacDermot, *History of the Great Western Railway* (1964), 86-8.

6 B. Simpson, *The Banbury to Verney Junction Branch* (1978), 9-11.

7 B. Simpson, *Oxford to Cambridge Railway - Vol.1* (1981), 11-15.

8 Ibid., 24 & 132.

the structural ironwork of the trainshed were taken by the Science Museum (South Kensington), and are preserved in their Wroughton store (Inv. No. 1969-379). The coal yard remained in use until the 1990s.[9] Recently the building has been used as a tyre repair workshop, and then until its recent closure a depot for Budget Car Hire.

2.1.4 The opening of the railway station in May 1851 was due to coincide with the opening of the Great Exhibition in the Hyde Park Crystal Palace, but it was only in December 1850 that preparations were made for building the terminus at Oxford. Dockray prepared a design for a conventional building of wood, stone and iron, in an eclectic style with both gothic and classical motifs, and tenders were invited for its construction. Since the LNWR was involved in transporting materials for the Exhibition building it is perhaps not surprising that the Board of the Buckingham Railway (at the suggestion of Capt. Huish) additionally asked Messrs Fox, Henderson & Coy. (sic.), the Engineers of the Crystal Palace, to tender for the Oxford terminus 'on the plan of the Exhibition building, in all respects', as information for the Board'. The spectacular construction in Hyde Park had already caught the imagination of the entire nation, was familiar through the pages of the *Illustrated London News*, and the use of the system would make a fitting publicity coup for the new station.

2.1.5 The connection between the former L.M.S. station and the Crystal Palace has long been recognised and commented on by a number of authors, indeed it was acknowledged that the station was 'constructed in a similar manner to the Crystal Palace' by *Jackson's Oxford Journal* at the time of its opening on 26 May 1851. The connection had never been fully explained until a proper examination was carried out by J.Munby of the records of the Buckinghamshire Railway in the Public Record Office (PRO Rail 86). His detailed historical account appears in Appendix A. The differences and similarities between the Station and the Great Exhibition are discussed further below. In the event, Fox and Henderson produced a quotation lower than the other bidders who had tendered for the conventional station design. The tendered price was £6,552, including 12 months maintenance. The note against the tender states that 'If corrugated Iron instead of boarding for sides of Passenger shed (were used) £31' The price included apparatus to warm the offices with hot water. The use of 4 lb. glass would add £400 to the price. The minutes state that 'Any alteration as to strength, or detail, which Mr Dockray may consider necessary, to be made at his request without increased cost to the Company. The whole to be completed ready for use in 3 months from Jany. 16th Instant'. The quote included the erection of locomotive shed, goods shed, water tower and weigh office. In the event, the building for the station cost £7,000 with a further £2,000 for turntables and machinery.[10] Examination of historic photographs reveals that the water tower and goods shed clearly also made use of Crystal Palace components, specifically the columns, arch and girders and it appears likely that the locomotive shed also used the same kit of parts.

2.1.6 It is clear that the station has seen several alterations to its structure over its 147-year lifespan. Many of these phases of alteration are documented in maps, plans and photographs. These changes are described in the following section, and summarised in the table at §2.2.8.

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9 B.D.P., (1989), 9-10

10 This section is abridged from Appendix A

2.2 THE CHRONOLOGY OF CHANGE

2.2.1 **The 1851 Station** [Phase I]

The earliest surviving plan of the station is the 1876 1:500 Ordnance Survey plan of Oxford (App. A, Fig. A3). This shows the site in great detail and probably shows the station much as built. The island platform is shown bisected by a transverse siding with wagon turntables. The plan is generally similar to that remaining today however, the internal arrangement of the rooms is somewhat different. The earliest known photographs of the station are a photograph showing the floods of 1875 (Pl. 1)[11] and a photograph of 1883 showing the Oxford Volunteers marching to the GWR station (Pl. 2).[12] Although neither are images of the station itself, shows show glimpses of it in a corner. The former shows a corner of the goods shed whilst the latter shows a corner of the porte-cochère. Both structures clearly demonstrate their Crystal Palace origins at this date and both clearly indicate that the transverse ridge-and-furrow roofs seen on later photographs were later additions. Both images also clearly show the decorative 'Paxton-esque' finials and crests used round the eaves.

2.2.2 **The Inserted Roof Supports** [Phase II]

The next known source is a railway plan dated July 1888, seen by Sutherland and since mislaid.[13] The inserted trusses and supporting columns, unusual in their use of two lengths of rail forming a tall 'A' frame, were shown as 'new' on this plan of the station dated July 1888. It is clear from an undated early photograph (Pl. 3)[14] that these supports were inserted to support the original longitudinal ridge-and-furrow roof and not the later transverse roof, so the 1888 date clearly only relates to the inserted structures and not to the later transverse glazing. It has been suggested that the combination of the older roof with the additional supports indicate that the photograph was taken during the alteration work and that the new frames were installed in dry conditions under the original roof, after which the photograph was taken, followed by the removal of that covering and subsequent re-roofing onto the already prepared supporting structure. Against this argument, there is no sign of building work in process - debris, scaffolding etc. Comparison of the photograph with the plan of 1876 shows that the rail-built roof supports and inserted girders cannot have been in place by 1876 as the supports would have obstructed the rails and wagon turntables which traversed the station.

2.2.3 **The 1903 Plan**

The earliest surviving official railway plan of the station is a tracing from 1903 (App. A, Fig.

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11 Minn Collection, Bodleian Library MS. Top. Oxon d.505 (from L. Waters, *Rail Centres - Oxford* (1986), 12.

12 Bodleian Library Minn Collection, from Simpson, *Oxford to Cambridge Railway - Vol 1* (1981), 24.

13 Sutherland, *Structural Engineer* 1975, citing plan no. 66792.

14 Simpson (1981), 29.

A4).[15] This appears to be based on the OS 1:500 but it shows the rail-built supports noted by Sutherland on the 1888 plan. This plan seems to have been traced to accompany detail drawings of the new swing-bridge over the Sheepwash Channel and therefore the exact internal arrangement of the station may well have been traced un-amended from the 1888 plan. Thus apart from the wagon turntables and transverse siding (which had clearly disappeared by 1903), the 1876 OS Map and the 1903 plan show identical internal arrangement to the station concourse and rooms. Therefore, the 1903 plan may well need to be treated with caution as a representation of the condition of the station at an exact date. The plan does however give more information on functions of the rooms within the station:-

West Range	*East Range*
Lamp Room Porter's Room	Station Master's Rooms
Waiting Room - prob.1st class (with cloak room and primitive toilets - both later destroyed)	Booking Office
Waiting Room - prob.Ladies or 2nd class (with attached toilets to west)	Waiting Room - prob. 3rd class & Store

Given the precise similarity of the internal layout of the station between the 1903 and the 1876 OS, it may well be safe to assume that the room names given on the 1903 plan would also be applicable to the earlier maps and plans.

2.2.4 The Oval Booking Office

The next source is the undated early photograph (Pl. 3). This has been ascribed the date 'c.1880' by Simpson as it shows both the inserted supports and girders and the earlier longitudinal roof.[16] The roof is shown to consist of six ridges, each of 8 feet width, and consistent with the Exhibition building, with only the middle two ridges glazed. This conflicts with a description of the Station as-built as having an entirely glazed roof. Whilst the platform shown is the original low one, this photo does however also show the platform faces to be of differing lengths, a feature not apparent on the plan of 1903. The oval booking office is first shown, a feature also absent from the 1903 plan. If the details shown on this plan are reliable, this would date this photograph to between the 1903 tracing and 1914 when dated photos show the later type of roof and a higher platform.

2.2.5 Raised Platforms and Transverse Roof

The next available sources a pair of photographs from 1914 (Pls. 4 & 5)[17] and an official plan dated 1920 (App. A, Fig. A5).[18] These show the round Booking Office and the

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15 Railtrack, Swindon D1290, dated 18/7/03.

16 Simpson (1981), 29.

17 Simpson (1981), 20 & 31.

18 Railtrack, Swindon.

heightened platform with faces of asymmetrical length. The photo also shows the later transverse ridge-and-furrow roof whilst the plan shows the re-ordered interior rooms. It is clear that the roof was strengthened before the erection of the oval booking office as the extra rail-built supports are shown on the 1903 plan whereas the oval booking office is not. The relocation of the Station Master's Rooms and the Booking Office to the oval building in the centre of the concourse is likely to have taken place at the same time as the general re-organisation of the facilities within the station buildings noticeable when comparing the 1903 and 1920 plans. This reorganisation produced the internal arrangements still perceivable today. The chimney breast in the north west building probably should be found to date from this period as during this re-organisation, the lamp room was converted into an office. If the plans are accurate then they would place the raising of the platforms, the re-covering of the roof, the re-ordering of the rooms and the installation of the round booking office to the period 1903-1914. The installation of the round booking office clearly took place first, probably during the earlier part of this period, judging by the carriages in the undated photo. The re-ordering produced a new internal arrangement thus:-

West Range	*East Range*
Store Porter's Room Gents Toilet	Office Parcels Office (inc. half of former Booking office)
Station Master's Office Booking Office	
Gents Waiting Room	General Waiting Room
Ladies Waiting Room (with toilets)	Ladies Waiting Room (with toilets)

2.2.6 **Later Changes for Railway Use** [Phase III]

The only substantial changes to the internal arrangements after this date was the insertion of the door and lobby in the eastern part of the south facade. This change occurred between the drawing of the plan dated 1920 and a dated photograph of 1936 (Pl. 9).[19] This was not related to the construction of the blue brick plinths and the removal of part of the central column of the south facade to create vehicular access to the concourse. These changes took place sometime between 1936 and 1940[20].

2.2.7 **Post-Railway Changes** [Phase IV]

The major changes which occurred after the closure of the station were the piecemeal removal of the dismantling of the majority of the trainshed and the removal of two bays to the Science Museum; the removal of the porte-cochère; the destruction of the goods shed and locomotive shed and water tank; the bulldozing of the former platform; the construction of the concrete block rear wall and the levelling of the raised platform ramps within the concourse; the construction of the present office within the concourse, the installation of the steel roller doors, items such as hoists, tyre racks etc. and the removal of some partitions.

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19 Simpson (1981), 25.

20 Ibid., 26

2.2.8 Summary of Changes

Events	*Date*	*Comment*
PHASE I AND IA		
Station built	1851	
OS plan	1876	Probably shows station much as built
PHASE II		
Side wings re-roofed	By 1888	Gutters of side wings incompatible with inserted side beams
Inserted supports in trainshed and concourse. Original transverse roof retained	'New' in 1888	Wagon turntables clearly suppressed by this time as they are incompatible with inserted supports
Re-arranged interior Round Booking Office etc.	1888/ 1903?-1920	Booking office, so therefore probably the remainder, shown in undated photo. Probably c.1905 if 1903 plan is reliable.
New transverse roof in trainshed/concourse	By 1914	
PHASE III		
Door & lobby in S. elevation	1920-1936	
Brick plinths	1936-1940	
PHASE IV		
Concrete block rear wall	c.1970?	
Office in concourse	Post-1960s	

2.3 THE GREAT EXHIBITION BUILDING

2.3.1 In view of the relationship between the LMS Station and the Great Exhibition Building the following comments are made on why the Crystal Palace, as it was known, is considered to be so important in terms of construction history.

2.3.2 It is generally considered that the design of the building was a joint venture between Sir Joseph Paxton and Sir Charles Fox. Paxton was a self-taught gardener who rose to become the greatest of his day and is now best remembered for the succession of wood, iron and glass greenhouses that he built on an ever-increasing scale. Paxton became an experienced engineer and developed machinery for working the timber elements of his greenhouses, in particular glazing bars and gutters.[21] Whilst it was Paxton who initially conceived the grand idea of building a huge iron and glass structure as a solution for housing the Great Exhibition of

21 J. McKeen. *Crystal Palace* (1994), 13-15.

1851, and the structure incorporated Paxton's patented detailing of the glass and timber elements, the realisation of his famous 'sketch on a scrap of blotting paper' could not have happened without the aid of Charles Fox and the resources of the engineering firm Fox, Henderson. It was thus Fox and his engineers who designed, built and tested all the iron elements and then erected the giant edifice in Hyde Park whilst Paxton contributed the concept of the cast iron arch modules, his patented wedge detail used to hold the elements together and his wooden gutters and glazing bars.

2.3.3 The building itself was erected in Hyde Park in 1850/51, providing 92,000 sq m of floor area and was designed and constructed in only nine months. This remarkable time was achieved by the use of prefabrication and standardisation of components. The building itself, whilst neither the first pre-fabricated building nor the first great construction of iron and glass, made an enormous impression on the public by its sheer scale and lightness. Because of its un-restrained and overt use of repetitive mass-produced iron and glass components it has been regarded as the first modern building. Following the exhibition, the main building was dismantled, re-erected and enlarged on a site at Sydenham in South London. The building lasted until 1936 when it was completely destroyed by fire. Since then the LMS station at Oxford has provided the only known reminder of this great structure and the modular castings of which it was built.

3 RECORDING STRATEGY

3.1 The archaeological study has involved the detailed investigation of archival and documentary sources. These sources have included the collection held by the Centre for Oxfordshire Studies, the records of the Buckinghamshire Railway Company held by the P.R.O., the photographic collection of the Bodleian Library, the National Railway Museum and the Railtrack archive at Swindon. All known published sources on the LMS station have also been consulted as have several of the better-known on the Crystal Palace (see Bibliography). The survey of the building involved detailed non-intrusive visual inspection of the main structure and the two side wings and included both loft spaces. A 5-metre ladder was used for access. The survey of the station prepared by C.E. Wide ARIBA for Dorothea Restorations was used as the basis for the drawn survey, the plans, sections and elevations being added to, enhanced and altered as appropriate; they are here reproduced as Figs 3-11, with colours to show the structural phases. Notes and sketches were prepared on site.

3.2 The excavation and detailed inspection of the footings of the various columns had been previously carried out in 1995 by OAU for Stanhope Properties.[22] The investigations were carried out by manual excavation apart from that which exposed the footing of the former porte-cochère which was excavated by machine. The reports on this work are reproduced below as Appendix B and C.

3.3 The elements held by the Science Museum were inspected and photographed whilst on display in the international exhibition *'L'Art de l'Ingénieur - constructeur, entrepreneur, inventeur'* at the Centre Georges Pompidou, Paris, 1997.

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22 OAU, *Oxford Rewley Road (LMS) Station - Investigation of Foundation Structure* (April 1995) and OAU, *Investigation of Foundation of Porte-Cochère - The Oxford Rewley Road (LMS) Station* (June 1995)

4 ARCHITECTURAL DESCRIPTION

4.1 GENERAL DESCRIPTION

4.1.1 *Plan.* (Fig. 3) The building consists of the central trainshed/concourse flanked by single-storey wings. The remaining part of the trainshed/concourse consists of four bays, 48 ft by 24 ft. The two southernmost bays originally comprised the concourse whilst the northern pair were part of the trainshed which formerly extended northward by a further nine bays. A transverse wall of concrete blockwork now divides the two surviving trainshed bays, the northernmost bay outside this wall being open-sided and derelict. There is a single 48 ft by 8 ft bay at the front (to the south of the concourse) which is the truncated stub of a porte-cochère. The missing porte-cochère bay measured 48 ft by 16 ft. The side wings are each 24 ft by 48 ft and each has a low extension to the north measuring 16 ft by 24 ft. The whole building is listed Grade II*. The structure is modular, the trainshed/concourse being formed between two rows of cast iron columns 48 ft apart. The columns are forming both the sides of the trainshed/concourse and those forming the sides and ends of the flanking wings are set at 24 ft intervals with further timber columns between them at 8 ft divisions. Many, if not all, of the cast-iron columns act (or once did) as down-pipes and are connected to drains in the foundations. Missing elements of the plan are the 48 ft by 16 ft porte-cochère to the south and nine further 48 ft by 24 ft bays of the trainshed to the north. The principal primary elements of two of the trainshed bays were acquired in 1969 by the Science Museum on account of their historical importance.

4.1.2 *Elevations.* The south elevation of the central concourse/trainshed comprises three cast iron and four wooden columns, connected by decorative curved bracing (spandrels and circles above) and is clearly reminiscent of the Crystal Palace (Fig. 4). The lower part of the central iron column has been removed to form vehicular access. The south wall is of timber studwork clad externally with lapped boarding and internally with corrugated iron (Pl. 47). The outside walls of the flanking office wings are of modular panels of timber studwork, generally reeded tongue-and-groove boarded internally, and lap-boarded externally (Pls 44-6). Apart from the wall of concrete blockwork mentioned above, all the external walls appear to be original, and in places the iron brackets fixing the wooden studwork to the columns can be seen (Pl. 54). The south and east/west external walls of the side wings have three door/windows and two wooden columns to each 24 ft bay (Figs 8 & 11). Many of the doors and windows appear to be original. The walls of the remaining, intact, trainshed bay comprise thinner infill panels which appear to be a hybrid between the construction of the outside walls and the standard screens of the trainshed as shown in historic photographs. These wall panels are surmounted by standardised, pre-fabricated wooden louvred ventilation panels (Pl. 53).

4.1.3 *Roof.* The roof of the trainshed/concourse is supported on 23 ft 4" lateral side beams and primary 47 ft 4" transverse trusses, both of which are arranged to span between the inside faces of the cast iron columns. Additional support is provided by further transverse trusses inserted between the original trusses. The 23 ft 4" lateral side beams are of two types, primary cast iron modular trusses (Pl. 32) being used in the northern two (trainshed) bays whilst fabricated wrought iron/steel trussed fish-bellied side beams (Pl. 33, secondary in origin) are used in the two southern (concourse) bays. The primary transverse trusses (those spanning directly between the columns) are of composite cast and wrought iron construction whilst the inserted trusses are fish-bellied and fabricated from wrought iron/steel. These latter are clearly contemporary with the fish-bellied side beams, both apparently being introduced c.1888. Within the remaining two northern (trainshed) bays, these secondary transverse

trusses are carried on A-frames made of reused rails (Pl. 38) whereas in the concourse they are carried by the fish-bellied side beams. All connections between the trusses and columns are bolted. The roof structure consists of timber and glass/asbestos hipped ridge-and-furrow modules 12 ft wide running transversely (Pls 30 & 53). It is known from photographic evidence that originally the trainshed/concourse was roofed with six 8 ft wide bays of longitudinal ridge-and-furrow roofing after Paxton's design. The earliest known interior photograph (Pl. 3) shows the longitudinal roof glazing with the A-frames already in position. The side wings are roofed using softwood trusses, the roof covering in these areas being of softwood roof boards clad in slate, overlain with pitch. The side wings each have a low clerestory. In places this clerestory is glazed, providing light to the rooms below via light wells.

4.1.4 *Interior.* The central concourse area is open, and the outline of the former circular, free-standing ticket office is marked by an concreted area within the York paving slabs of the circulating area (Fig. 3). The area of the former ramp to the heightened platform has been levelled however, its former extent and gradient has been preserved at the edges. Little evidence therefore remains of to show where the railway lines entered into the currently enclosed part of the building as shown on the OS map and the 1903 plan. The side walls between the concourse and the flanking wings are arcaded with modular stud-built panels with arched openings (Figs 9 & 10). The majority of these openings appear to have always functioned as doorways however several have been blocked subsequently. The one exception is one 8 ft panel in the western wall of the concourse which is clad with corrugated iron (Pl. 29). The interior of the south wall is also clad with corrugated iron. Both areas of corrugated iron appear primary. The side walls of the trainshed bays have been discussed in 4.1.2. The side wings are partitioned internally with stud walls clad with tongue-and-groove boarding. Historic map evidence shows that the wings housed the railway offices, waiting rooms and lavatories; comparison of plans shows that the disposition of these spaces has changed over time. The principal rooms in each side wing each had a fireplace. The former Booking Office-General Waiting Room/Parcels Office in the east wing had a flat ceiling with a central light-well whilst much of the ceiling in over the Waiting Room in the west wing was raised and decorated with heavy moulded plaster cornices (Pls 61-5).

4.1.5 *Platform remains etc.* At the north end of the building, the derelict bay of the former trainshed retains little more than its structural members (Pl. 53). The roof retains only gutters/cornices, hip rafters, ridge plate and rafters. The side screens discussed above are missing but one length of the wooden louvred ventilation panels survives on the western side. The platform area is a partially buried but some stone paving and bull-nosed edging stones remain visible to indicate the height and extent of the platform. A pair of buffers from the siding to the east of the trainshed survive, partially buried, to the north of the eastern flanking offices (Fig. 3). The area immediately to the north has been reduced to a level below this and it is therefore unlikely that much apart from the truncated supporting walls remain of the platform beyond this point. The column-bases and foundations of the missing nine bays of the trainshed are however likely to survive under the surface of the car park which now occupies this area.

4.1.6 As stated above, missing elements of the station include the free-standing, circular ticket office, the outer bay of the porte-cochère, and nine bays of the trainshed. Two of the missing bays of the trainshed are however held in the collection of the Science Museum. Other important missing structures are the water tower of the locomotive depot which stood north of the Sheepwash Channel which contained similar columns and spandrels, and the earlier phase of the Goods Shed which stood to the west of the station. Surviving photographs show

this to have latterly had a matching roof to the trainshed/concourse. It clearly also had matching columns, cast iron side beams and ventilator panels to the trainshed. The earliest exterior photograph (Pl. 1) also shows that it originally had a similar longitudinal ridge-and-furrow roof and decorative finials and crests as the station.

4.1.7 A detailed description of the historic elements of the station follows in §5 (Iron) and §6 (Timber), which for convenience is here summarised. The disposition of these elements will be found in the schematic diagrams (Figs 1 & 2).

4.1.8 *The principal elements present within the station which are similar to those visible in contemporary published drawings of the Crystal Palace (Figs CP1-6) are as follows:-*

- *Cast iron columns (hollow, circular section with square fillets), probably c.19 ft long (C1)*
- *Cast iron columns (ditto), 14 ft 10" long (C2)*
- *Cast iron columns (ditto), 14 ft 4" long (C3)*
- *C.I. extension columns (ditto), 3 ft 2½ long (E)*
- *23 ft 4" cast-iron girders (B1)*
- *47 ft 4" composite cast iron/wrought iron trusses (T1)*
- *Decorative panels - spandrels, 7 ft 4" wide (A1)*
- *Decorative panels - rectangle with circle, 7 ft 4" wide (P1)*
- *Intermediate timber columns (semi-circular section with square fillets) (C4)*
- *Timber ventilation panels (trainshed and goods shed), 7 ft 6" long (V1)*
- *Timber ventilation panels (trainshed and goods shed), 15 ft 10" long (V2)*

4.1.9 *Unique elements, not found in the published drawings of the Crystal Palace but clearly of similar conception and presumed to be part of the Fox & Henderson design for the station are:-*

- *C.I. columns (as C2 with one gutter inlet and flange), 14 ft 4" long (C2a)*
- *C.I. columns (ditto with two gutter inlets and flanges), 14 ft 4" long (C2b)*
- *Cast-iron foundation columns with connections to drainage*
- *Cast-iron decorative column base (square)*
- *Cast-iron decorative column base (six-sided)*
- *Decorative panels - spandrels, 15 ft 4" wide (A2)*
- *Decorative panels - rectangle with two circles, 15 ft 4" wide (P2)*
- *Timber exterior wall panels (W1, W3 & W4)*
- *Timber interior arcade panels (W2)*
- *Timber trainshed side screens (W5 & W6)*

The method of fixing the trusses to the columns is also distinct from the Crystal Palace practice, in that bolts rather than wedges were used. The method of fixing the timber wall panels to the columns is the same as that used in the Crystal Palace.

5 Detailed Analysis of the Iron Structure

5.1.1 Most of the principal elements of the building have previously been identified and analyzed in reports by Sutherland and the Building Design Partnership.[23] Much of the following analysis of the structural elements is based on, and adopts the nomenclature of, the latter.

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23 Sutherland (1975), 69-72; BDP (1989), 10-15.

5.1.2 The disposition of these elements will be found in the schematic diagram (Fig. 1) based on and amended from that prepared by BDP.[24] Note that all dimensions quoted in the text are in Imperial units as all the elements of this modular building were cast/constructed to that system.

5.2 Iron and Steel Trusses

5.2.1 The primary Truss type **T1** is 47 ft 4" long and 3 ft ½" in depth (Fig. 5, Pl. 29). These trusses are constructed primarily of wrought iron angles and flats rivetted together, with cast iron cruciform uprights which are elegantly barrelled in the lateral plane (Pl. 31). This type of truss is similar but not identical to those of the same span used in the Crystal Palace (Fig. CP2) and it is undoubtedly a primary feature. In the LMS building the truss is a Pratt type with a single (tension) diagonal between each vertical. In the Crystal Place there were two diagonals, the other being a wooden 'dummy', apparently to achieve conformity with the side beams. These trusses are bolted to the columns, thus avoiding Paxton's patent wedge fixing used in the 'Crystal Palace'. A further difference concerns the addition of ¼" thick flange plates added to the top and bottom rails of the trusses used in the Oxford station as well as two 2½" x 2" angles added to the bottom rail of the Oxford trusses. It is unclear why these were added, assuming that the Crystal Palace members carried a similar roof load and performed satisfactorily. There are four sets of holes drilled in the top flange, consistent with the likely location of the gullies between the former longitudinal ridge-and-furrow glazing.

5.2.2 Truss type **T2** spans between the inserted 'A' frame 'columns' (C5) of the trainshed (Fig. 7, Pl. 38) and consists of steel/wrought iron sections rivetted together. In structure, materials and execution they are similar to T3, T4 and B2 and all are interpreted as secondary (c.1888). These inserted trusses effectively halve the span of the roof between the Tl trusses and appear to have been introduced for that purpose as if problems were encountered with the original roof spanning 24 ft. The T2 trusses are shorter (c.46 ft) and deeper (4'2") than the T1 trusses and they are diagonally braced to the supporting 'A' frames by raking struts. Photographic evidence and holes in the upper flange show that they pre-date the replacement of the original longitudinal ridge-and-furrow roof. It has been speculated that these trusses are an original feature however, the makeshift appearance of the rail-built columns supporting them make this unlikely (Pls 49 & 53). In addition, the rail-built supports would appear incompatible with the transverse siding and wagon turntables.

5.2.3 Trusses of type **T3** are similar in all respects to those of type T2 and are also inserted but are used only in the concourse area (Fig. 6; Pl. 30). They are also inserted between the primary transverse trusses (T1) within the former concourse area but, to avoid the use of the rail-built supports the are carried by (inserted) side beams (B2). They are thus 4 ft 2" deep and exactly 48 ft long. As with T2, these trusses are interpreted as secondary and of the same build as T1.

5.2.4 Truss type **T4** is similar to T2 and T3 except that it is fish-bellied, being 4'2" deep for two-thirds of its length before reducing to 3 ft ½" at the point where it connects with the supporting columns. There is only one example of this type, in the stub of the porte-cochère (Fig. 4). As with T2 and T3, this truss is interpreted as secondary and of the same build as T1.

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24 BDP (1989), Diagram 1.

5.3 SIDE BEAMS

5.3.1 The primary side beams (**B1**) are cast iron trusses 3 ft ½" deep and 23 ft 4" long (Pl. 32 & 53; Figs 9 & 10). They are present only in the two remaining trainshed bays although there is evidence that formerly similar trusses existed in the concourse area. Each cast truss is divided into three panels by four uprights of cruciform section. Pairs of integrally-cast cruciform diagonals brace each panel. They span the 23 ft 4" between columns but are effectively non-load bearing apart from a nominal roof load. They are identical in overall size and cross sections to the same elements in the Crystal Palace (Fig. CP1 & 2). The casting differs however from the addition of bolt holes and associated local thickening in the end uprights and the absence of the small fillets on the top and bottom of the flanges, used in the wedge fixing system.

5.3.2 The secondary side beams (**B2**) are formed from wrought iron or steel angles and flats, rivetted together (Pl. 33). Their depth varies between 3 ft ½" at the support and 4 ft 2" for the middle two-thirds of their length. They span the 23 ft 4" between columns of the concourse and support the trusses T3 at their mid-point, thus avoiding the need for a column/'A'-frame obstructing the arch leading through to the flanking wings. These side beams are clearly contemporary with the 'A'-frames (C5) and the secondary trusses T2, T3 and T4. These side beams re-utilise bolt holes in the column extension pieces which match those used to fix the primary B1 side beams and it is most likely that the secondary B2 beams replaced side beams of the B1 variety as the earlier type, being of cast iron, would not have been able to support a concentrated load at their mid-point.

5.3.3 The side beam **B3** (BDP L) occurs only once in the building, on the eastern side of the remaining stub of the porte-cochère. It is a lattice girder formed from 2" wrought iron or steel angles, rivetted together. Its depth is 3 ft ½" and its length is 7 ft 8". This side beam is shown only on latter-day photographs of the eastern side of the porte-cochère itself (Pl. 19). Both this beam and the missing side beam B4 (below) replace primary cast iron elements and this change appears to be associated with the insertion of column C6. This change occurred some time between 1940 and 1951. It is thought likely that the replacement of the earlier elements was the result of a lorry hitting the original column.

5.3.4 The side beam **B4** no longer exists but it was a variant of the side beam B3 and is shown on latter-day photographs of the eastern side of the now-missing part of the porte-cochère (Pl. 18). It must have been 3 ft ½" deep and 15 ft 8" long, occurring only once in the building, on the eastern side of the porte-cochère. It was also lattice girder formed from 2" wrought iron or steel angles, rivetted together. As with side beam B3, B4 replaced primary cast iron elements (see §5.4.9).

5.3.5 **B5** is a variant of B1 shown in photographs of the goods shed and the water tower at the locomotive shed (Pls 24-6). This side beam would have measured 7 ft 4" by 3 ft ½" and was effectively a shortened version of B1 with only one pair of diagonals. There is no evidence for the use of this side beam in the Oxford station itself or in the Crystal Palace and it is presumed that it was cast by adapting the B1 pattern. This side beam was used on its own in the goods shed and in conjunction with A1 arches in the water tower. It would appear that they were bolted to the columns in both instances.

5.4 COLUMNS

5.4.1 The cast iron columns, type **Cl, C2** and **C3** are all to the same basic design. The basic variation is in length. The longest (C1) were used in the trainshed. The columns of middling length (C2) were used in the concourse area and the shortest (C3) were used in the flanking wings. In all cases these columns are circular in section with four flat faces providing both a decorative feature and a flat surface for beam and truss connections. In each case, the ends are provided with a flange for bolting to extension pieces or wall plate at the top. Flanges are also present at the bottom of each for bolting to the foundation columns (bottom). They are circular in section with square fillets, hollow and 8" in external diameter. In section they are identical to the Crystal Palace columns (Fig. CP3) and all are interpreted as primary features. These columns function as rainwater downpipes as well as structural members. Paint analysis by Prof. G. Brino has indicated that the columns (and no doubt the rest of the structural ironwork) bear traces of light blue and canary yellow paint, the same colours as used in the Crystal Palace.

5.4.2 The remaining columns of type **C1** are now only present in the derelict northern bay of the remaining part of the building. Four of these columns therefore remain on site however, the six columns in the Science Museum collection are also of this type. These columns were used only in the trainshed part of the station although it appears likely that columns of this type were also used in the goods shed. They are provided with 2" thick flanges top and bottom for bolting to the extension pieces and foundation columns. At c.19 ft long, they are the longest of the cast iron columns, the extra length being needed as these columns were fixed to their foundation columns at rail level rather than at platform/concourse level as in the case of the C2 columns.

5.4.3 The cast iron columns of intermediate length (**C2**) are used only in the concourse/porte-cochère and terminated at platform/concourse level. They are 14 ft 10" long. These columns occur in three variants, C2, C2a and C2b. Type C2 (BDP C1) is the basic design of this column. Apart from their shorter length, they are identical with type C1 and have no features of interest apart from the top and bottom flanges and their bolted connections. This type of column was used for the (now truncated) central column of the south facade and throughout the porte-cochère (including the five missing columns). Some, if not all, functioned as downpipes.

5.4.4 **C2a** (BDP C2) is a variant of C2 (Pl. 34). These columns are used at the points where the southern trainshed bay meets the northern concourse bay and where the southern concourse bay meets the porte-cochère. This type is identical to type C2 apart from the fact that the upper flange is 16" deep and within this there is a large square hole in the lateral side surrounded on three sides by an integrally-cast flange. Water from the valley between the flanking wings and the concourse is led through the openings via an awkward, and apparently secondary, arrangement of lead hoppers and gullies which do not respect the flanges round the openings. It would appear that an earlier valley gutter originally spanned directly between these flanges however, the later side beams (T2) would have precluded the continued use of such a gutter by their greater depth. Each also has a similar blocked opening with flange on the external face, this opening being set some 4" above the existing valley. These columns were specially cast for the Oxford station and their openings and flanges appear to indicate that the roofs over the flanking wings are not primary.

5.4.5 **C2b** (BDP C2) is a further variant of C2 (Pl. 35-6). This design of column is used to between the first and second bays of the concourse. This type, of which there are only two

examples, also possesses the 16" deep upper flange and is identical to C2a in all respects except that there are lateral openings and gutter flanges in both the northern and southern faces as well as the opening in the external face. These columns no longer act as downpipes and in both cases both of the lateral openings and the transverse openings are sealed using wooden blocks. As with C2a, these columns do not occur in the Crystal Palace drawings and their presence also adds weight to the theory that the roofs of the flanking wings are secondary.

5.4.6 Column type **C3** (no BDP number) is the shortest (c.14 ft 4") of the primary column types used and is only present within the external walls of the flanking wings (Pl. 44). They also function as downpipes and apart from their shorter length, they are generally the same as those of types C1 and C2. They do however, differ in that their upper flange is only .75" deep and is used for the fixing to the wall plate. This wallplate/flange detail appears to be unique to the Oxford structure however, these columns are also interpreted as primary.

5.4.7 Columns **C4** (BDP C3) are timber copies of the cast iron columns. They are discussed in section 6.1 below.

5.4.8 Columns **C5** (BDP C4) are constructed from two lengths of wrought iron double-headed rail forming a tall 'A' frame (Pl. 38), fixed horizontally with bolts and spacing pieces at approximately 4 ft centres. They are set into the building by about 1 ft from the wall and are not connected to the cast iron side beam behind. These columns are contemporary with trusses T2, T3 and T4. Because these columns are shown on the earliest photograph of the interior of the station (Pl. 3), it has been speculated that they are an original feature. this is considered unlikely as not only are they shown as 'new' on the plan of 1888 but their makeshift appearance make this unlikely in a structure built by Fox & Henderson. The rail from which they are made would appear to have some rarity value, being of wrought iron and dating as it does from before 1888.

5.4.9 Column **C6** (BDP C5) supports the eastern corner of the truncated porte-cochère. It is a rolled steel universal column section and is clearly secondary, probably contemporary with the lattice beam B3 and B4 which it supports/supported. Photographic evidence shows that this column dates from sometime between 1940 and 1951 (Pl. 19). It replaces a cast iron column of type C2 and it is thought likely that this replacement is likely to have been the result of a lorry accident (see §5.3.3 and 5.3.4).

5.5 Column Extension Pieces and Foundation Columns

5.5.1 **E** is a standard casting (E) used to extend the cast iron columns of the concourse and trainshed (Pl. 39). In all cases, the trusses and side beams of the roof are bolted to these extension columns (not wedged as in the Crystal Palace, Fig. CP3). This standard casting is 3 ft ½" long and identical in section to the columns. These elements are quite clearly primary. These members are flanged at both ends, a .75" thick square upper flange providing the fixing for the wooden gutter/cornice and a 2" thick square lower flange providing the fixing to the columns beneath. The lower flange projects slightly from the column on the faces where a truss or side beam connects to these members, thus relieving the bolts of any downward loading. As stated in §5.4.6, the upper wallplate flange does not appear in the published Crystal Palace drawings.

5.5.2 From the trial holes excavated by OAU and BDP,[25] it has been shown that all the cast iron columns are founded on 8" external diameter round cast iron foundation columns (**F**, Pl. 40) connected to the columns by a 2" thick square flange and four bolts. Only one (that of the porte-cochère) has so far been fully excavated.[26] It was found that this hollow foundation column terminated in a integrally-cast side branch leading off to a ceramic drain. This feature is similar in conception, but very different in execution, to the column base castings in the Crystal Palace (App. C, Figs 3-4). From the apparent use of six cast iron columns as downpipes in the concourse alone, it seems probable that in the earlier roof structure, all the cast-iron columns were used as downpipes.

5.6 Cast Iron Arcade

5.6.1 The decorative cast iron arches/spandrels **A1** occur in the south elevation of the concourse and the west side of the remaining stub of the porte-cochère (Pl. 43). Each arch is, in reality, composed of two spandrels. The remaining examples span the 7 ft 4" between the iron or wooden columns to which they are fixed by bolts. These arches are exact copies of an element used extensively in the Crystal Palace and they are one of is the most distinctive elements of the station structure (Fig. CP1 & 4). There are integrally-cast decorative scrolls where these arches spring from (and are bolted to) the columns and the join between the two spandrels is lapped over by a decorative moulded feature ('voussoir') cast onto one of the spandrels. Photographs of the water tower at the former locomotive shed show these arches/spandrels also to have been used in that structure (Pl. 24).

5.6.1 Similar cast iron arches/spandrels **A2** were used in the lost part of the porte-cochère where the 15 ft 4" gap between the columns needed to be spanned (Fig. 4; Pl. 18). These elements appear more clearly as spandrels although it is unclear exactly how these elements were cast. The radius of the each spandrel was the same as for A1 but there must have been some alteration to the standard pattern as the use an un-modified pair of spandrels would have resulted in only one of the spandrels having the of the moulded 'voussoir'. This aspect of this element has no parallel in the Crystal Palace and it is therefore presumed that this member was made by adapting the standard pattern used to make A1.

5.7 Cast Iron Decorative Panels

5.7.1 The cast iron decorative panels **P1** occur above each A1 arch/spandrel (Pl. 43). They are separate castings formed by a circle within a rectangular panel measuring 3 ft ½" deep and 7 ft 4" long. They are fixed to the columns and to the arches/spandrels by bolts. These panels are also exact copies of an element used extensively in the Crystal Palace (Fig. CP5).

5.7.2 No examples of the cast iron decorative panels **P2** remain in the building. They formerly occurred above each A2 arch/spandrel in the missing south, east and west sides of the porte-cochère proper (Pl. 18). They appear to have been a double length version of P1, formed of two circles within a rectangular panel measuring 3 ft ½" deep and 15 ft 4" long. They were, in all probability, also fixed to the columns and arches/spandrels by bolts. These

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25 BDP (1989), photograph 20.

26 OAU (1995) - See Appendix C.

panels did not occur within the Crystal Palace and it is presumed that they were cast by adapting the P1 pattern.

5.8 Cast Iron Column Bases

5.8.1 There are two basic designs of decorative cast iron column base used in the LMS station. These to cover the flanges where each cast iron column is fixed to its foundation column. They are also used at the base of each timber column. The most commonly used type is square in plan and is used on the exterior of the building (Pl. 42). These are cast in two pieces, the two halves being united by machine screws locating into integrally-cast lugs. Photographic evidence (e.g. Pl. 12) shows that the same bases were used in the lost portions of the porte-cochère and at the bases of the external wooden columns (C4) before they were truncated and the brick plinths inserted (1936-1940). An alternative design which formed six sides of an octagon in plan were used at the bases of the wooden and iron columns in the concourse (Pl. 41). Similar bases were used in the Crystal Palace, however although fixed together in an identical manner, these were to a different design.

5.9 Connections - Iron to Iron Elements

5.9.1 The principal difference between the primary structure of the LMS station and the Crystal Palace is the manner in which the trusses and beams are connected to the columns. Instead of the wedge fixings used in the Paxton patent, in the LMS station the trusses are connected to the columns by means of two iron bolts of approximately 1" diameter (Pl. 39). The bolts and flanges used to connect the various lengths of column/extension/foundation are virtually identical to the standard Crystal Palace detail (Fig. CP3).

5.9.2 The-use of bolts rather than the Crystal Palace wedge device, raises an interesting question. Was the change made for technical reasons, such as to provide a more rigid connection or, since it appears that Paxton was not directly involved in the LMS building, was it to avoid using his patent? If the latter is the case, it may indicate that his patented gutter beam, used to span the 24 ft between the trusses at the Crystal Palace was also not used in the LMS structure. This possibility is discussed further in section 9 below.

5.10 Decorative Finials and Crests

5.10.1 The two earliest photographs of the station show the eaves of both the goods shed and the station to have had very distinctive decorative crests and the corners of both structures were finished with tall finials (Pls 1 & 2). The crests were used to hide the roofs behind and were a feature of both the Oxford station and the Crystal Palace. It is known that the crests at the Crystal Palace were of zinc and there is no reason to think that those used at the Oxford station were otherwise (Fig. CP4). The crest motif was replicated, albeit in wood, on the roof of the free-standing secondary Booking Office (Pls 13 & 20). The finials of the Oxford station appear to differ from the finial/flagpoles shown in photographs of the Great Exhibition at Hyde Park which appear blunter at the top. The Oxford finials closely resemble the balusters used to hold the handrails of the upper galleries of the Crystal Palace and it is possible that the finials used on the Oxford station were an adaptation of this element.

6 DETAILED ANALYSIS OF THE TIMBER STRUCTURE

6.1 INTERMEDIATE TIMBER COLUMNS

6.1.1 Columns **C4** (BDP C3) are timber copies of the primary cast iron columns (C1, C2 and C3) albeit without the flanges top and bottom (Pl. 44). They are only three-sided and are used in pairs between the iron columns in all the external walls of the flanking wings and in the arcade between the concourse area and the wings. In the south facade they support no load (apart from that imposed by the partial removal of the central iron column) but those in the side wings and arcade support at least part of the load imposed by the timber trusses of the wing roofs. All but two of the timber columns in the external walls of the flanking wings were truncated between 1936 and 1940 when brick plinths replaced the lowest 3 ft of the external walls. Those used in the south elevation of the concourse remain intact to their full length. These wooden columns are identical in size and construction to timber columns used in the Crystal Palace (Figs CP4-5) and they appear to be primary.

6.2 TIMBER WALL PANELS

6.2.1 The external walls of the side wings (**W1**) are formed of tri-partite panels between each iron column: each incorporates two timber columns (Pl. 44). These panels appear to have been manufactured in-situ. They are constructed of 4½" by 2" studwork clad externally with horizontal 6.75" by $^{7}/_{8}$" ship-lap of a type which appears consistent with that used on many Buckinghamshire Railway stations, on both the Oxford and Banbury Branches. In general, these panels are clad internally with vertical $6^{3}/_{4}$" by $^{7}/_{8}$" reeded tongue-and-groove boarding (Pl. 46). Elsewhere, this type of boarding is interpreted as primary but there are frequent cases of its re-use. Generally, in conception but not detailing, these panels are similar to the tri-partite timber panels used to a limited extent on the Crystal Palace, and the method by which they are fixed to the iron columns (using cast iron butterflies) is identical (Fig. CP5; Pl. 54). The principal differences are the use of square-headed sash windows and the use of ship-lap boarding externally. Some of the wall panels in the Crystal Palace were boarded (one side only) on exposed rails whilst others were lathed and cement-rendered. At present it remains unclear whether these panels are primary however, careful dismantling would be likely to reveal more evidence. Given that the side wings were originally top-lit by Paxton-style ridge and furrow roofing, it would seem unlikely that the present square-headed windows are primary but again, intrusive investigation would be likely to reveal more about their origin. These panels now sit on a three foot high plinth of blue brick however, photographic evidence shows that these panels originally extending down to just above ground level, the change occurring sometime between 1940 and 1951. As stated above, in the south and east/west walls, each tri-partite panel generally has a double sash window between each column. The exceptions to the rule are the south and east walls of the east wing where each panel is pierced by a door, and the east wall where the northern bay of each panel are also pierced by doors. It is known from historic photographs that the door in the south wall was originally a matching window until sometime between 1920 and 1936 (Pl. 4). Photographic evidence is lacking for the east wall no external doors are shown on the historic plans until that of 1920. This shows the double doors at the north end of the east wall and a window at the point where the single southern door now pierces the wall. This latter door was clearly originally a window and the pair of double doors to the north appear consistent with the partitioning of the former Booking Office in the east wing to form a parcels office and a General Waiting Room.

6.2.2 The arcade between the concourse and side wings **W2** is formed of similar tri-partite panels, each again including a pair of timber columns (Pl. 47). Each is fixed to the cast iron columns by Crystal Palace type cast iron butterflies. In general, each of these panels contains three round-headed doorways although one has only a pair, its third bay being entirely of corrugated iron. The round-headed doorways appear to be pre-fabricated but the panels themselves seem to have been constructed in-situ from 4" by 2" sawn softwood studs, clad on the flanking-wing side with the vertical $6^{3}/_{4}$" reeded tongue-and-groove boarding (Pl. 46) associated with primary work. The concourse face is clad with corrugated iron. This corrugated iron may be noted in the earliest photograph of the interior of the station (Pl. 3) and close inspection appears to indicate that it is original work. (Surviving corrugated iron of this period would have considerable rarity value and technical merit). Most of the doorways are now blocked although most still retain their glazed fanlights. The most south-westerly arched opening was widened below fanlight level at sometime during its railway use but all the remainder retain evidence of consistent door-stops and hinges. It is therefore presumed that all the arched openings were originally matching, each with a pair of doors, some of which may always have been fixed shut.

6.2.3 The south wall of the concourse (**W3**) is made of two tri-partite panels, each with a pair of wooden columns to which the decorative A1-type arch/spandrels are fixed (Pl. 48). The W3 wall panels themselves are composed of 5" by 2" studs, clad externally with the standard horizontal ship-lap (as W1) but clad internally with corrugated iron, which again appears to be primary (Pl. 47). There remain some horizontal timber rails on the concourse face. These rails originally supported enamel signs and railway notice boards. The wall panels extend up to the level of the decorative cast iron P2 panels. This uppermost part of the wall was originally left open for ventilation but has been infilled with hardboard in recent years. It is possible that these wall panels were originally lathed and cement rendered but, without dismantling the ship-lap this could not be determined.

6.2.4 The external wall panels of low side wings (**W4**) are composed of 4" by 2" studs, clad externally with the standard horizontal ship-lap boarding (Pls 51-2). These walls are pierced with various doors and windows of differing types, those in the eastern wing appearing to be earlier, their round-headed form mimicking the arcading elsewhere in the station. The hipped roofs of these two buildings are partially hidden behind the wall panels, again appearing to mimic the original arrangement of the roofs over the concourse and flanking wings (see §5.8.1). The opening between the low western side wing and the main flanking wing is quite clearly modern. The corresponding opening between the eastern wings is first shown on the plan of 1920, earlier plans showing a door only. The presence of a wooden half-column in this opening, facing into the low side wing (Pl. 50), is interpreted as evidence that the side wings are of secondary origin (see also below), although the evidence of the 1:500 OS map shows that they had clearly been constructed by 1876.

6.2.5 The wall panels between trainshed and low side wings (**W5**) are constructed of a single skin of $8^{3}/_{4}$" reeded vertical tongue-and-groove boarding, facing outward (Pls 51-2). They stop short of roof height, ending at the lower edge flange of the B1 cast iron side beams. These panels are not fully studded, the boarding instead being fixed to the outside face of 3½" deep chamfered horizontal rails which are attached to the cast iron columns by Crystal Palace type butterflies. These rails are carefully shaped so that they curve from 6" thick at their centre points to $1^{3}/_{4}$" thick at the point where they fix to the columns. Both the remaining panels of this type have been pierced with two doors into the low side wings. Although all of the original doors have been lost, it is immediately apparent that all the openings are of differing dimensions and that the architraves/door-cases also differ. The dimensions of two of these

door openings have furthermore been altered on at least one occasion. All of these door openings are interpreted as secondary. Plate 3 shows that this type of panel was used for side screens throughout the trainshed before all (bar the remaining pair) were replaced with new screens to a different design sometime between the time of that photograph (c1900) and 1914. The remaining pair appear to have been preserved because the low side wings had been built against them by this time. Part of the cladding from the west wall of the low eastern side wing was missing at the time of survey and it was clear that the studding of this wall of the side wing was not attached the boarding of the W5 wall panel. Furthermore, the face of the wall panel thus revealed was thickly painted a white/light grey paint, indicating that not only was the low side wing secondary, but also appearing to preserve an early external paint scheme.

6.2.6 The trainshed side screens which replaced the early W5 side screens (**W6**) have all been lost. They were erected sometime between c1900 and 1914. They lacked the curved rails and latterly each had a pair of wooden borders affixed to frame large advertising hoardings (Pl. 24).

6.3 TIMBER VENTILATION PANELS

6.3.1 Wooden Louvred ventilation panels **V1** and **V2** were noted below eaves level, outside of the primary cast iron side beams in the remaining two northernmost (trainshed) bays of the building, above the extant side screens panels (Pl. 53). These panels are 34¼" deep, enabling them to fit snugly between the upper and lower flanges of the side beams. Each panel is made up of two separate sub-modules, connected end-to-end. These sub-modules were of differing lengths, the shorter V1 module (7 ft 6" long) always occurring to the north of the longer V2 module (15 ft 10" long). Each panel consists of stiles, top and bottom rails, mullions and six horizontal wooden louvres. These panels are shown on historic photographs of both the station and the goods shed although they appear to have been removed from all but the southern two bays of the trainshed by 1914 (Pl. 5). It is presumed that these panels were also once present above the arcaded wall panels (W2) between the concourse and the flanking wings, prior to the replacement of the original cast iron side beams with the secondary fabricated wrought iron/steel side beams (B2). These panels resemble closely similar panels shown in lithographs and photographs of the Crystal Palace. Unfortunately the published drawings only show patent openable metal louvres (Fig. CP5) although it is quite plausible that they were not illustrated because of their prosaic nature. These panels are interpreted as being primary, partly on account of the un-necessary join between the sub-modules, suggesting that they were not pre-fabricated for use in this particular building.

6.4 CONNECTIONS - TIMBER IRON ELEMENTS

6.4.1 In general, all connections between timber and iron elements are made using coach-screws. Worthy of particular note is the cast iron 'butterfly' bracket used to connect the timber wall panels of types W1, W2, W5, and probably W3, to the cast iron columns (Pl. 54). This particular detail is identical in conception, although not in execution, to the fixing used in exactly such locations in the Crystal Palace (Fig. CP5).

7 DETAILED ANALYSIS OF THE ROOFS

7.1 THE ROOF OVER THE TRAINSHED/CONCOURSE

7.1.1 The present roof over the Trainshed/concourse consists of eight hipped bays of transverse ridge and valley roofing (Figs 9-10). The valleys are set at 12 ft centres, over the primary transverse trusses (T1) and the secondary, inserted trusses (T2, T3 and T4). A further transverse 8 ft hipped bay survives over the stub of the porte-cochère. Historic photographs show that there was a further 16 ft hipped bay over the missing section of the porte-cochère and a further eighteen 12 ft hipped bays over the missing nine bays of the trainshed (Pl. 7). As has been noted above, the inserted trusses pre-date the present roof which is first shown on photographs dated 1914. But the present roof can be shown not to be primary, as will be described.

7.1.2 The undated photograph (Pl. 3) shows the primary and secondary trusses supporting an earlier longitudinal ridge-and-furrow roof, six bays wide, running North/South, perpendicular to the trusses. Examination of the holes in the upper flanges of the transverse trusses shows that the valleys were at 8 ft centres, coinciding with the positions of the vertical members of the trusses as well as the iron and wooden columns in the south elevation. Such a roof closely mirrors that used in the Crystal Palace (Figs CP1 & 6). Prior to the insertion of the secondary transverse trusses, the original valley beams would have had to span the 24 feet between the primary trusses, exactly in the manner of the Crystal Palace roofing. In the Paxton building, the valleys were supported by Paxton's patented trussed 24 ft gutter beams (Fig. CP6). No clear evidence exists to confirm the use of the Paxton gutter beams in the Oxford station and their under-slung tie-bars would not have been compatible with the insertion of the secondary transverse trusses. It is probable that, as with the wedged truss and column fixings, Paxton's patents were deliberately avoided in the design of the roof of the station. It is worth noting that the original roof was replaced on both the station and goods shed after a relatively short life. The roof of the locomotive shed is also recorded as receiving repairs in 1877 and 1879 prior to its total rebuilding in 1883[27] and it is probable that this structure was provided with a similarly faulty design of roof. Pre-fire photographs of the roof of the Crystal Palace on the Sydenham site also show that much of the ridge-and-furrow roofing had also been replaced, in that instance with flat, leaded roofs. There is no clear evidence that any part of the current roof was salvaged from the original roof, and in any case the glazing bars would have been too short. The valleys might merit closer inspection after removal of paint to establish if there is any evidence of re-use. Some early glazing bars have come to light during this survey in the light-wells in the roof of the flanking wings (Pl. 58), (see §7.2).

7.2 THE ROOFS OVER THE FLANKING WINGS

7.2.1 The current roofs over the flanking wings are substantial timber trussed structures with integral light wells (Figs 5 & 6). The roof trusses are supported on substantial secondary wall plates, which appear to be constructed from teak; the trusses are of queen-post form, and there are part-trusses at the sides of the light-wells (Pls 55 & 62). Where the current roofs abut the concourse, the trusses are supported by secondary iron brackets fixed to the iron and timber columns (Pl. 57) whereas within the western wing the trusses are fixed at their eastern

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27 Waters (1986), 43

ends on a stout timber plate supported by secondary stop-chamfered softwood posts (Pl. 56). The roofs themselves are clad with sawn softwood roof-boards, covered with slate. The slates have subsequently been overlain with bitumen or pitch. One of the primary partitions within the western wing protrudes into the roof void and the profile of this partition (Pl. 59) indicates that this roof is not an original feature of the station, the primary roof being shown to have been transverse ridge-and-furrow, with valley gutters spanning the 24 ft between the outer walls of the flanking wing and the wall of the concourse. This confirms the observation made regarding the gutter flanges and rainwater inlets in the type C2a and C2b columns. This theory is given further weight by the discovery of primary tongue-and-groove cladding in the roof void around the chimney within the western flanking wing (Pl. 60). The profile of this cladding is again consistent with transverse ridge-and-furrow roofing running east-west at 8 ft centres. Further evidence was revealed in the roof void of the eastern flanking wing where the studding of one of the light wells was found to include several re-used sections of glazing bar (Pl. 58). In addition, further lengths of what appeared to be re-used ridge pieces were discovered strengthening the ceiling over the former Ladies Waiting Room and toilets in the south end of the western wing. As this ceiling must be contemporary with the re-roofing of this flanking wing, it is speculated that it is unlikely to have been in need of immediate strengthening and it appears possible that the re-used ridge piece may have come from the original roof of the trainshed/concourse. The undated photograph (Pl. 3) indeed indicates that the re-roofing of the trainshed/concourse post-dated the re-roofing of the flanking wings as the original gutters between the C2a and C2b columns had clearly been suppressed by the time of this photo.

7.3 The Roofs over the Low Side Wings

7.3.1 The roofs over the low side wings deserve little comment (Pls 51-2). They each have a pair of low hipped roofs arranged longitudinally (Fig. 6), appearing to mimic the original arrangement of the roof over the trainshed/concourse. The valley/spine between each pair of hipped roof is supported on a substantial joist, that in the eastern wing having stop-chamfers on its lower arrisses. The roofs are generally conventional, being constructed in situ from sawn softwood, lathed and slated. They are construed as being primary features of the low side wings, i.e. pre-1876 but not original. From the exterior, the roofs are partially hidden behind the external walls, mimicking the original appearance of the primary roofs over the trainshed/concourse and flanking wings.

8 The Interior

8.1 The Concourse

8.1.1. Most features of the concourse have already been discussed in the sections dealing with the iron structures, the wooden structures and the roof. The most obvious features within the concourse area are the northern concrete block wall (Pl. 29) and the office in the south-eastern corner. These are clearly secondary, dating from the use of the building as a tyre centre. Some original and later railway features do however remain in-situ. Much of the original floor of the concourse proper retains its original York stone paving and the outline of both the free-standing Booking Office and another oval structure remain clearly visible, infilled with concrete (Fig. 3). The sites of the barrier round the Booking Office and various chocolate machines etc. may also be recognised. The northern end of the currently enclosed area (originally the first bay of the trainshed/platform) was much altered when the platform

height was raised sometime pre-1914. This coincided with the re-siting of the buffer stops one and a half bay further north and the building of a ramp between the concourse and the raised platforms. The part of this ramp south of the concrete block wall which now defines the enclosed area has been re-levelled to the original platform height and at one point the original York stone paving is still visible through a gap in the concrete screed which has been laid to produce a level working area for the former tyre centre. The profile of the ramp has been preserved adjacent to the east and west walls where the levelling stopped short some 50cm from the walls themselves. Beyond the concrete block wall the raised platform surface is preserved for some 12 ft (within the derelict part of the trainshed) but beyond this point the ground level had been reduced to approximately the level of the original platform to form a level car-parking area.

8.2 The Eastern Flanking Wing

8.2.1 Much of the important interior features of the side wings have similarly been discussed elsewhere in this report. Early uses of the rooms are shown on plans (App. A, Figs A4 & A5), and a phased plan (Fig. 3) explains which walls are primary and which are not. Furnishings (including fireplaces) have been removed, but the principal feature of note is the large and elaborately corniced ceiling and light-well of the former Booking Office (Pl. 65). This was left intact when the room was partitioned to form a General Waiting Room and a Parcels Office. Although the ceiling has been much damaged since, sufficient remains to reconstruct its appearance. This ceiling, as with all those in the flanking wings, dates to the replacement of the original ridge-and-furrow roof over the side wings (pre-1888). The walls retain their original reeded tongue-and-groove cladding, with earlier paint schemes visible where the partition has been removed (Pl. 63). Another light well was discovered intact within the southern part of the roof. This had been plastered over when the wall between the Stores/east Ladies Toilets and the Ladies Waiting Room was moved, between 1920 and 1936. This light well is the one which incorporates sections of re-used glazing bar (Pl. 58). The stores to the east evidently did not have a ceiling as that side of the exterior of the light well is plastered between the studs and the truss, purlins, hip-rafter and roof-boards retain traces of limewash. The former extent of the east Ladies Toilets is revealed by a concrete area of floor; this area was later modified by the insertion of a door and entrance lobby in the south wall.

8.3 The Western Flanking Wing

8.3.1 The principal features of note in the western side wing are the elaborately corniced high ceiling of the former First-Class Waiting Room (Pl. 61), the geometric-tiled floor of the toilets and the small west Ladies Waiting Room with attached Ladies Toilets. Close examination within the roof void revealed the site of the wall which divided the First-Class Waiting Room from the small rooms to the west. The arrangement of rooms shown on the 1876 and 1903 plans (App. A, Figs A4 & A5) was thus clearly shown to have been perpetuated after the replacement of the roof, the western rooms clearly extending up into the roof void, evidenced by the limewashed trusses, purlins and roof-boards above the current ceiling (Pl. 62). These small eastern rooms precluded the lighting of the large Waiting Room by natural light from the east windows and it is therefore likely that the raised portion of roof over this room would have been glazed until the Waiting Room was extended to the east (pre-1920). Unlike the east Ladies Waiting Room, there was no evidence of a light well illuminating the west Ladies Waiting room. The original finish of the reeded tongue-and-

groove boarding was preserved above the inserted ceiling of the west Ladies Toilets. The finish here was dark varnish, perhaps including a stain. Observations made elsewhere indicate that this finish may have been employed in all rooms, perhaps with a darker stain/varnish below dado height, divided by a 1" painted black band.

9 DISCUSSION

9.1 This building seems to tell a complex story with number of different elements and different levels of complexity. The first is one of railway competition in which a small independent railway, largely locally promoted and designed to serve local needs came to play a part in the complex and bitter railway politics of the decade after the 'Railway Mania', resulting in the curiously British phenomenon of adjacent and competing railway stations, whose external expression was designed to express the aspirations of the parent company and woo the travelling public. The two adjacent stations in west Oxford both opened in the year of the Great Exhibition at Hyde Park and for the first time the railways geared-up to transport unprecedented numbers of day-trippers of all classes to the metropolis. Indeed, both the railway and the Crystal Palace built to house the exhibition were expressions of their age. The radical concept of constructing a pre-fabricating such a giant building in the Black Country and erecting it in London, and transporting the masses in such numbers would both have been inconceivable prior to the opening of the Liverpool to Manchester railway just twenty-one years earlier and arguably impossible to execute until the year of the Exhibition itself.

9.2 A race was on to open the new Oxford stations for the lucrative excursion traffic, the somewhat conservative broad-gauge GWR rapidly throwing-up a temporary structure of timber whilst the (by-then) LNWR, under the dynamic leadership of Capt. Huish, resorted to the far-sighted and radical solution employing Messrs Fox and Henderson not only to provide a pre-fabricated modular structure, capable of later enlargement without demolition, but also one which would capture the public imagination. Despite the obvious and direct similarity with the Crystal Palace building, close inspection of the Oxford station itself and the published drawings of the Crystal Palace reveals that very few members of the Oxford building exactly match those of the great structure erected in London and considerable re-working of the foundry patterns would have been necessary, both to suit the form of the building and circumvent the Paxton patents. Indeed the close timing of the erection of both buildings may even mean that a complete second set of patterns was needed for the Oxford station. It is clear that the thinking behind copying the Crystal Palace design for the Oxford station was not simply to provide a quick fix to an immediate problem but to reap publicity value. In spite of all the structural changes necessary to the modular parts, the resulting building clearly made a vigourous attempt to use all the decorative and structural motifs of the Crystal Palace, close study revealing that numerous details such as the decorative spandrels, the crests and even the colour scheme were as they were not for reasons of economy but purely for decoration and mimicry. This can only be the result of a conscious expression of showmanship and an attempt to capture the imagination of the population of Oxford and to encourage them to take the more circuitous LNWR trains to the capital (see App. A. §6.2).

9.3 The rapid alteration of the patterns and the attempts to by-pass the Paxton patents clearly led to defective design and detailing in the Oxford structure. Chronic roof problems occurred, not just in the station but also in the goods shed and locomotive shed apparently built to the same design. Clearly a roof with valleys the length of the Oxford trainshed with no apparent

fall was pushing technology to the limit, even without suspect foundations and an untried design. There is no doubt that Fox and Henderson could have provided a more than adequate pitched or vaulted roof in iron and glass - indeed they probably had more experience of iron and glass roofs than any other firm at that time - but the brief called for the copying of the Paxton style of roof with all its potential pitfalls and probably without it patented strongpoints.

9.4 Whilst the original building reflected so much about the zenith of the age of steam, iron, railway politics and even the euphoria and self-confidence of British society as represented by the Great Exhibition, the building in its developed form also reflects other aspects of life in the second half of the 19th-century. Because of its early closure, the station buildings have remained almost unchanged since the turn of the century and thus the side wings still retain much of extravagant assemblage of stores, lamp rooms, offices and waiting rooms, once so typical of railway stations. The proliferation of waiting rooms with their attached toilets is illuminating. The building came to have four waiting rooms, to modern eyes an absurd number for a station with only one platform, serving a line which after the initial burst of excursion traffic, soon settled into an existence as a secondary cross-country route. The railway plans are specific regarding the Waiting Rooms only as to gender but not to class but examination of their scale and grammar of ornament appears to illustrate that the railway may have given both sexes and all classes access to travel but in Victorian and Edwardian Britain, unlike America at the same period, to travel clearly did entail crossing social or sexual divides.

10 CONCLUSION

10.1 The study of the building has revealed something of the amount of primary structure surviving, and confirmed that the side wings are part of the original plan. It has shown the variety of primary materials, including glass for the roofs, cast and wrought iron for the structure, and timber for additional columns and walling. It has also suggested the ways in which the individual parts are similar to, or differ from, those used in the Crystal Palace. The avoidance of Paxton's patents are suggested as a reason for some of these changes.

10.2 The complexity of the early development of the building is also beginning to be understood. It now appears that whilst the plan is much as originally conceived, many changes occurred to the building within the first fifty years of its life, principally involving the complete replacement of the Paxton-style ridge-and-furrow roofing over both the trainshed/concourse and the side wings as well as the loss of much of the decorative detailing above wallplate level. There does however, appear to be substantial amounts of primary material in the wall panels and partitions despite changes of status and use of many of the rooms (sometimes more than once), and the building changing from one which was principally top-lit to one which was largely side-lit.

10.3 The importance of the Crystal Palace was not just in the use of pre-fabricated cast-iron and glass (for which there had been many precedents) but for the scale of the whole enterprise, and the overt and explicit use of a modular system employing industrial mass-produced parts in a very public building. It can be seen as a pioneering example of system building, and since the loss by fire of the rebuilt Crystal Palace at Sydenham, the Oxford Station is the last surviving representative of this very influential phase of Victorian architectural progress that lay behind key ideas in modern architecture. Indeed, the station probably owes its existence to the (perceived) ready availability of mass-produced parts in the final stages of completing

the Exhibition building. Of particular interest is the survival of timber elements of the Crystal Palace design in the side wings, as examples of Paxton's genius for combining the use of cast-iron and timber.

10.4 Some elements of the building's history cannot be determined without further, and in some instances intrusive, investigation. Some methods (such as paint analysis) clearly lay outside the present study. Prior to demolition a full archaeological investigation would be necessary to provide archaeological and historical information on parts not currently accessible or visible, with any additional survey necessary for rebuilding. Any additional survey would be to a specification agreed with the City of Oxford and English Heritage, and would include items that might not be included in rebuilding (such as the paving or platform edges), and may include specialist studies on the iron and timberwork, remains of painted decoration, and plasterwork.

Rob Kinchin-Smith, M.Soc.Sc.(Dist.)
Oxford Archaeological Unit
March 1998

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Archival Sources

- Railtrack Records Section, Swindon: GWR Plans
  No detailed drawings except plans of Station yard layout, c.1900 and later (transferred from Euston). Drawing No. 66792 seen by Sutherland could not be traced in 1994. A drawing of the existing swing-bridge is dated December 1906 (fiche 16330-1).

Documentary Sources

Reference has been made to the following publications:-

- R. Christiansen — *A Regional History of the Railways of Great Britain Volume 13 Thames and Severn* (D&C, 1981).
- C. Downes & C. Cowper — *The Building erected in Hyde Park for the Great Exhibition* (Weale, 1852, repr V&A, 1971).
- Dr P. Hendry & R.P. Hendry — *An Historical Survey of Selected LMS Stations* Vol. 2, (OPC, 1986).
- G. Herbert — *Pioneers of Prefabrication. The British Contribution in the Nineteenth Century* (John Hopkins, Baltimore Md, 1978)
- E.T.MacDermot & C.R. Clinker — *History of the Great Western Railway* (Ian Allan, revised edn, 1964).
- J. M^{c}Kean — *Crystal Palace* (Phaidon, 1994).
- Bill Simpson — *The Banbury to Verney Junction Branch* (OPC, 1978)
- Bill Simpson — *Oxford to Cambridge Railway* Vol. 1: Oxford to Bletchley (OPC, 1981)
- R.J.M. Sutherland — 'Oxford Midland Station and the Crystal Palace', *The Structural Engineer* Feb 1975, No.2 Vol. 53, 69-72
- L. Waters — *Rail Centres: Oxford* (Ian Allen, 1986).

Cartographic Sources

- Ordnance Survey 1st Edition 1:500 map

Survey specification

Plans: The existing building is about 100ft (30 m) square, and a plan indicating all principal components at a scale of 1:50 should be prepared, with any necessary details (e.g base of booking office) at a scale of 1:20.

Elevations: All four external elevations and four internal elevations should be drawn at a scale of 1:50, indicating all principal components. The side compartments should similarly be recorded internally where necessary.

Sections: Sections through the building (E-W) on at scale of 1:50 should be drawn at a number of points to be determined. Details of one original roof truss and columns should be drawn at a scale of 1:20, with annotated copies (reduced) indicating any differences on other trusses.

Details: Typical construction or decorative details should be drawn at a scale of 1:10.

Photography: A general photographic record of the appearance of the building should be made.

Documentary study

Local: The photographic collections of the Bodleian Library and Centre for Oxfordshire Studies should be investigated for early views of the station, or any other relevant records of the structure.

National: The deposited records of the Buckinghamshire Railway should be investigated for any information relevant to the structure, together with the current BR engineering records.

General: The existence of dismantled parts of the station at the Science Museum or elsewhere should be investigated and recorded, for addition to the survey of the existing structure.

1.
1485

PARK END STREET
(North Side)

Premises occupied by
Regional Tyre
Services Limited

SP 5006 SE 7/797

II

2.
1851/2. Part of the old London Midland Scottish Railway Station. Cast-iron structure clad with weatherboard on a brick plinth. 3, 6, 3 bays, the central 6 with a projecting canopy. Hipped slate roof. The building is said to re-use parts of the 1851 Great Exhibition building.

SCHEDULE

In the entry for

7/797

PARK END STREET
(North Side)

Premises occupied by
Regional Tyre
Services Limited

The grade shall be amended to read II*

Signed by authority of the
Secretary of State

M. A. L. ROSS
A Principal in the Department
of the Environment.

Dated the 4th December 1985

KEY

Brick walls

Concrete block

Timber studwork

Missing walls missing (Archaelogical Evidence)

Conjectured walls (Documentary Evidence)

Iron columns

solid wooden half columns

Phase I and IA (original and earlier)

Phase II (late Victorian/Edwardian)

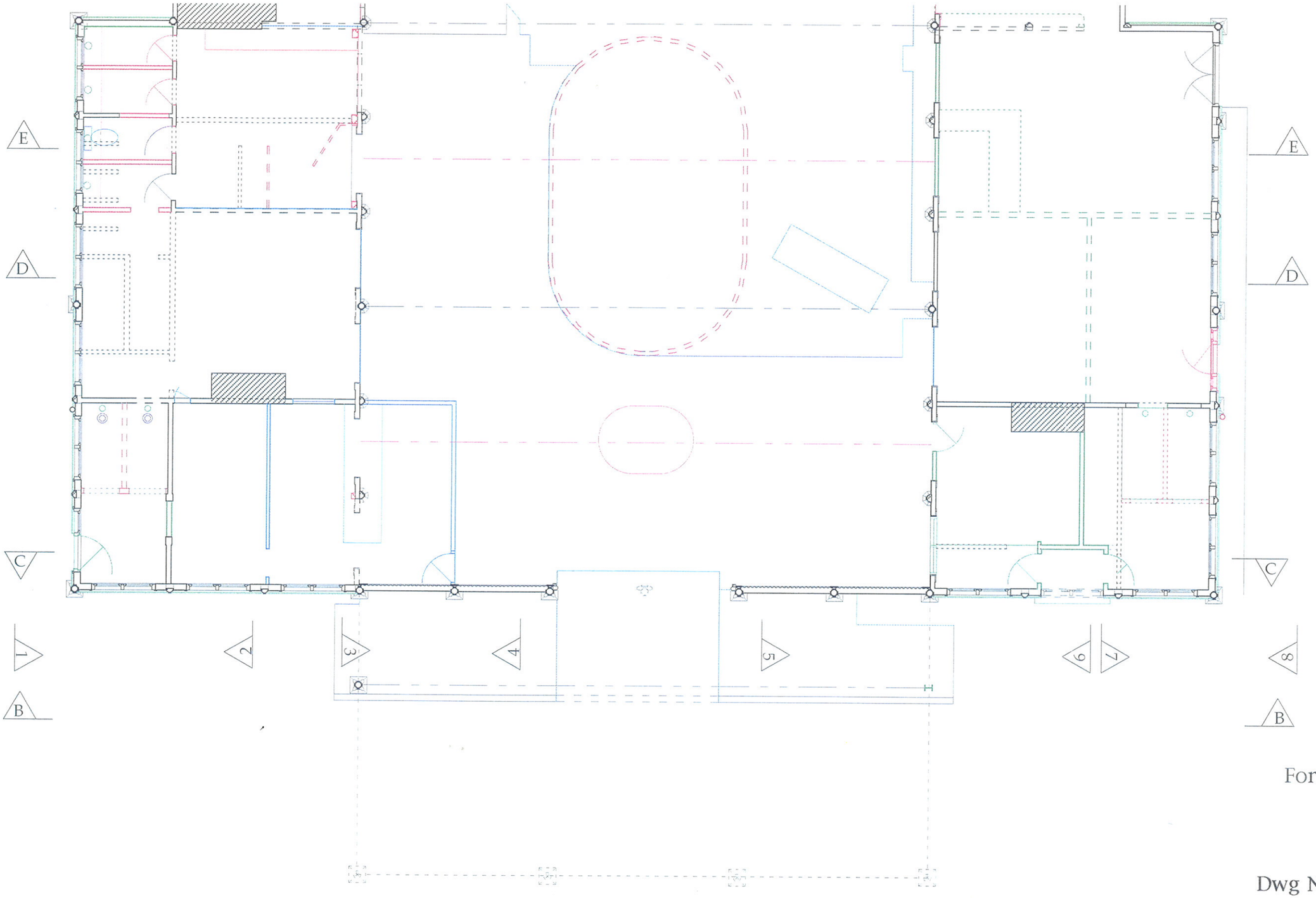
Phase III (c1920-c1960)

Pase IV (modern alterations)

1 2 3 4 5 6 7 8 9

A B C D E F

tion, Rewley Road, Oxford



Former LMS Station, Rewley Road, Oxf

Former LMS Station Building
Rewley Road, Oxford.
Plan.
1:100 Record Drawings
Dwg No : 1597/9. March 1998
For Oxford Archaeological Unit

CEW

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Bramford House, 23 Westfield Park, Redland, Bristol BS6 6LT
Telephone: (0117) 973 1636
Fax: (0117) 973 3782
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KEY

hidden features

missing features

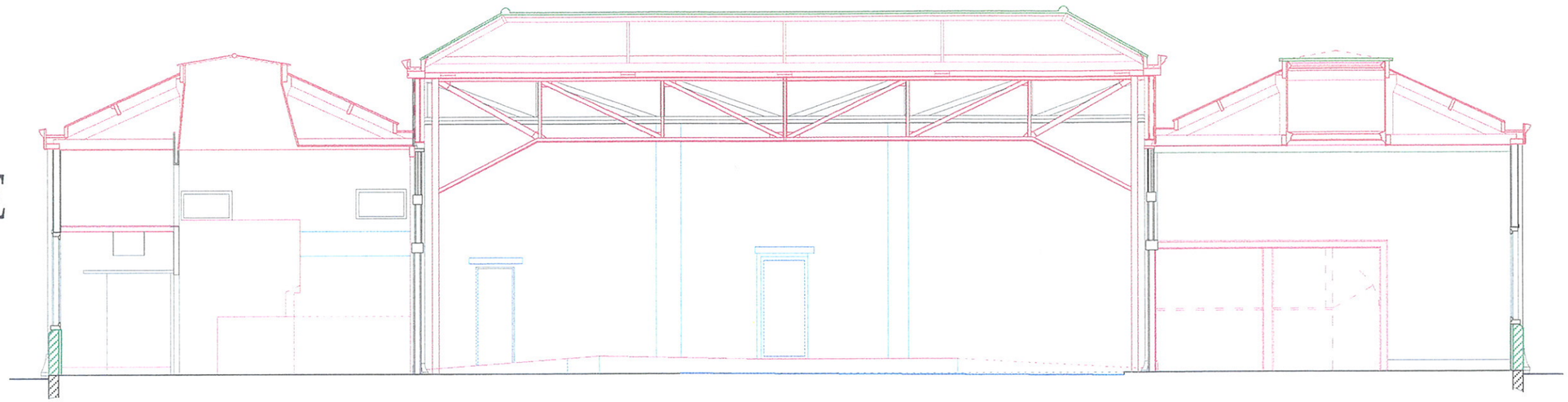
Phases I and Ia

Phase II

Phase II

Phase IV

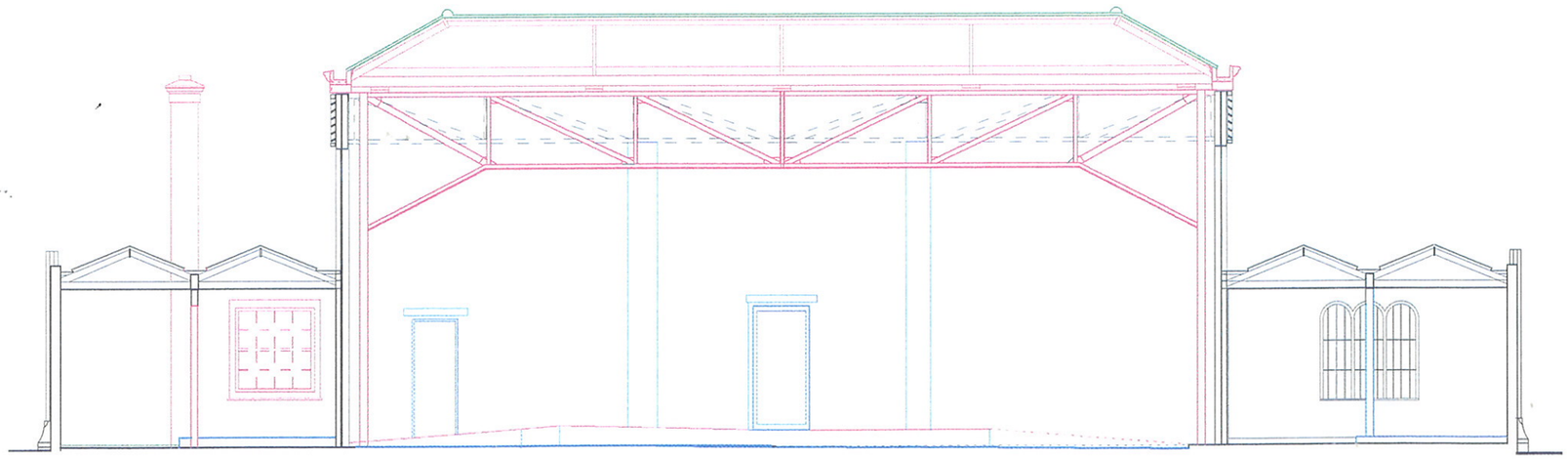
E



E

SECTION E-E

F



F

SECTION F-F

Former LMS Station Building
Rewley Road, Oxford.
Sections E-E & F-F
1:100 Record Drawings
Dwg No : 1597/12. March1998
For Oxford Archaeological Unit

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Colin E. Wide ARIBA, Chartered Architect
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1.
1485

PARK END STREET
(North Side)

Premises occupied by
Regional Tyre
Services Limited

SP 5006 SE 7/797

II

2.
1851/2. Part of the old London Midland Scottish Railway Station. Cast-iron structure clad with weatherboard on a brick plinth. 3, 6, 3 bays, the central 6 with a projecting canopy. Hipped slate roof. The building is said to re-use parts of the 1851 Great Exhibition building.

SCHEDULE

In the entry for

7/797

PARK END STREET
(North Side)

Premises occupied by
Regional Tyre
Services Limited

The grade shall be amended to read II*

Signed by authority of the
Secretary of State

M. A. L. ROSS
A Principal in the Department
of the Environment.

Dated the 4th December 1985

Application for Scheduled Monument Consent

Ancient Monuments and Archaeological Areas Act 1979 (as amended) Section 2

To be completed by or on behalf of the applicant in BLOCK CAPITALS or typescript.

1. Applicant

Full name: RAILTRACK PROPERTY

Address: TEMPLE GATE HOUSE
TEMPLE GATE
BRISTOL

Postcode BS1 6PX Tel No. 0117 934 8170

2. Occupier of the Monument (if not the applicant)

Full name: AS ABOVE

Address:

Postcode Tel No.

3. Monument to which the application relates

Name (if any) of the monument: REWLEY ABBEY

Address or location: REWLEY RD
OXFORD

County Monument Number: OXON 80

National Grid Reference: SP 5055 0645

4. Description of the proposed works

RE-SITING OF LMS BUILDING - HISTORIC STATION, LISTED GRADE II*, TO BE MOVED AND REBUILT WITHIN THE S.A.M.

5. List of plans and drawings accompanying the application

AA39054/02 SITE PLAN

6. Any other information relevant to the application

A SEPARATE NOTE IS ATTACHED GIVING DETAILS OF THE PROPOSED WORKS AND THEIR RELATIONSHIP TO THE ARCHAEOLOGY

I/We hereby apply for scheduled monument consent for the works described in this application and shown on the accompanying plans and drawings.

Signature D Wilkinson Date 20/3/96

*on behalf of OXFORD ARCHAEOLOGICAL UNIT for RAILTRACK PROPERTY

*Where the application is being dealt with by an agent to whom correspondence should be sent, state the:

Name of Agent: OXFORD ARCHAEOLOGICAL UNIT (DAVID WILKINSON)

Address of Agent: 46 HYTHE BRIDGE ST
OXFORD
OX1 2EP

Postcode ↗ Tel No. 01865 204642

Certificate in accordance with paragraph 2(1)(c)

It is hereby certified -

(1) that the applicant is unable to issue a certificate in accordance with either paragraph 2(1) (a) or 2(1) (b) of Schedule 1 to the Ancient Monuments and Archaeological Areas Act 1979;

(2) that the applicant has given the requisite notice (w) of the accompaying application to the following persons who, at the beginning of the period of twenty-one days which ended on the date of the application, were owners (x) of the monument to which the application relates, namely (y):

Name Address

and

(3) that the applicant has taken such steps as are reasonably open to him to ascertain the names and addresses of the remainder of the persons who at the beginning of that period were owners (x) of that monument and has been unable to do so.

Signature _____ Date _____

Certificate in accordance with paragraph 2(1)(d)

It is hereby certified that the applicant is unable to issue a certificate in accordance with paragraph 2(1) (a) of Schedule 1 to the Ancient Monuments and Archaeological Areas Act 1979, but has taken such steps as are reasonably open to him to ascertain the names and addresses of the other persons who, at the beginning of the period of twenty-one days which ended on the date of the application, were owners (x) of the monument to which the application relates and has been unable to do so.

Signature _____ Date _____

(w) **Form AM112A**

(x) **"Owner means a person who is for the time being owner in respect of the fee simple in the monument or is entitled to a tenancy of the monument granted or extended for a term of years certain, of which not less than seven years remain unexpired.**

(y) **Insert names and addresses.**

NOTE - The Secretary of State may refuse to entertain an application for scheduled monument consent unless it is accompanied by one or other of the following certificates signed by or on behalf of the applicant.

Forms of Certificate
for the Purposes of Paragraph 2(1) of Schedule 1 to the Act

Certificate in accordance with paragraph 2(1)(a)

It is hereby certified that no person other than the applicant was the owner (x) of the monument to which the accompanying application relates at the beginning of the period of twenty-one days which ended on the date of the application.

Signature _____ Date _____

Certificate in accordance with paragraph 2(1)(b)

It is hereby certified that the applicant has given the requisite notice (w) of the accompanying application to all the persons other than the applicant who, at the beginning of the period of twenty-one days which ended on the date of the application, were owners (x) of the monument to which the application relates, namely (y):

Name	Address
MR TIM DELNEVO (LAND AGENT)	LAND AGENT'S OFFICE (UNIVERSITY OF OXFORD) 55 LITTLE CLARENDON ST OXFORD OX1 2HS

Signature _____ Date 20/3/96

Rewley Abbey - Oxfordshire Monument No. 80

Scheduled Monuments Consent Application for *New site of LMS Station building*

Supporting statement of archaeological context

1 Archaeological Background

An archaeological field evaluation was carried out at the site in March/April 1994, supplementing previous work in 1986. The evaluation report (OAU July 1994) has been provided to English Heritage. This report should be referred to for general background, together with Drawing OXSTRA/DEV/4 - detailed information about the preserved archaeology which will be directly affected by the proposed development, are discussed below.

2 Summary of Development Proposal

It is proposed to re-site The LMS Station building which currently stands on the corner of Botley Road/Rewley Road. The proposed new site is in front of the current Oxford Station building (Drawing AA39054/02), on an area earmarked for development as a hotel. The LMS building is listed Grade II*, and a separate listed building application to dismantle and re-erect the structure is being made to Oxford City Council. The proposed new site has the advantage that the facade of the new building would face down the entrance axis of the station forecourt, and be visible from the Botley Road - it also provides an appropriate railway-related setting for the structure.

Only a very small part of the structure is within the scheduled area (Plan AA39054/02).

3 Details of development and relation to archaeology.

The LMS structure has been shown to have deep foundations consisting of cast iron columns which extend c. 2.5 m below ground level. These columns are an integral part of the structure and would need to be moved with it. The principal ground disturbance on the new site will therefore arise from excavation for these foundations, which would be most logically carried out as a series of 3 m wide parallel trenches. the two outer trenches would be c. 20 m long, and the inner pair 35 m. These trenches are shown in blue on Drawing AA39054/02.

The only possible archaeological deposits found in this area of the site were undated buried soils in Trench 5, to the north (Plan AA39054/02).

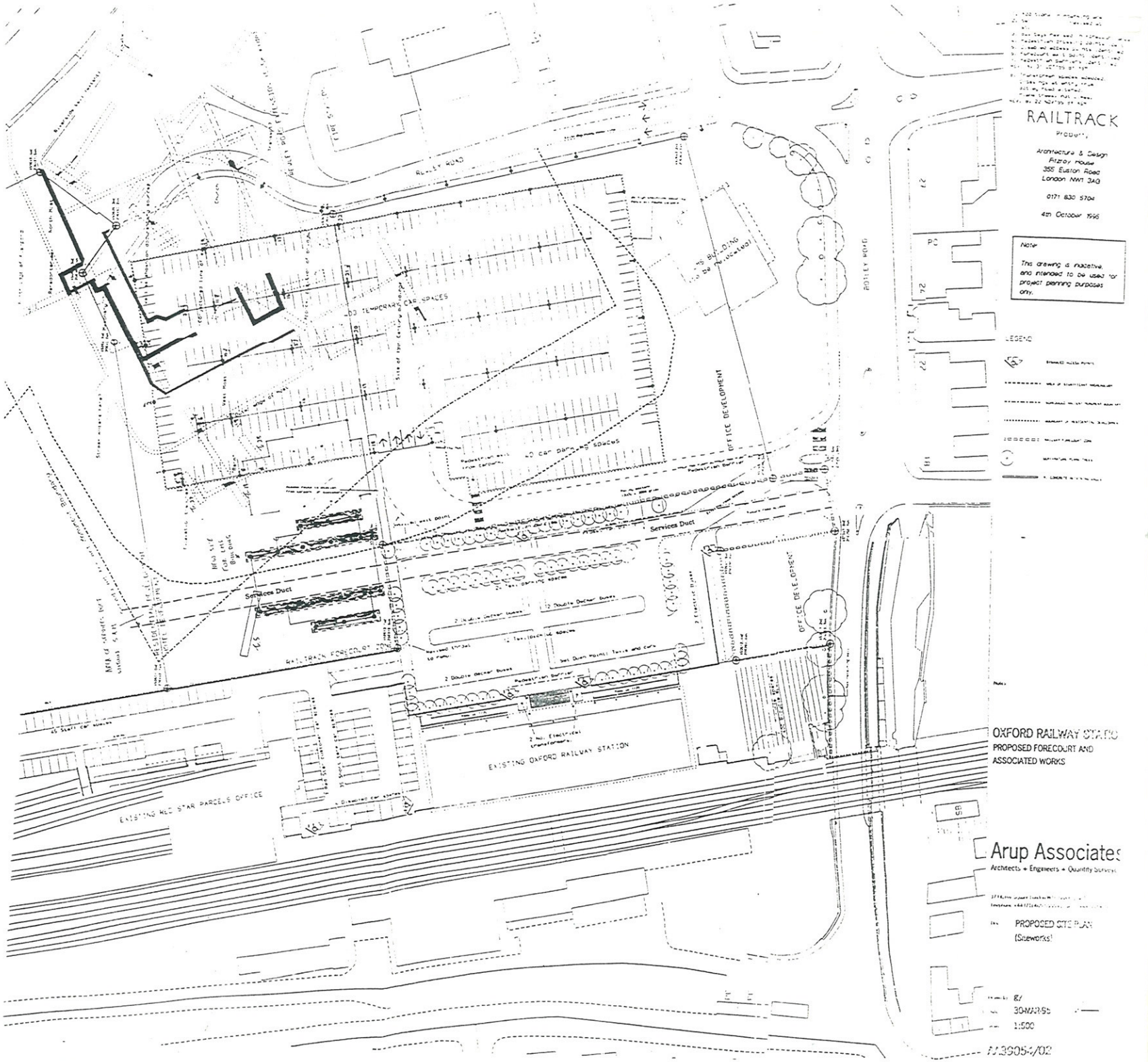
Other below-ground disturbance could result from services to and from the building, but details of these would depend on how the building is integrated with any eventual hotel structure on the site. However, services could easily be accommodated within the 1.2 m (or greater) post-1850 overburden which exists on this area of the site, so

that they would have no impact on any surviving archaeology.

4 Mitigation

The foundation trenches would be excavated by machine under the supervision of a qualified archaeologist. Following removal of the post-1850 overburden, any archaeological deposits revealed would be hand-excavated and recorded.

David Wilkinson, OAU, 20/3/96


RAILTRACK
Property
Architecture & Design
Fitzroy House
356 Euston Road
London NW1 3AG
0171 830 5704
4th October 1996
Note
This drawing is indicative, and intended to be used for project planning purposes only.
LEGEND
RAILWAY ROAD
OFFICE DEVELOPMENT
Services Duct
EXISTING OXFORD RAILWAY STATION
EXISTING RED STAR PARCELS OFFICE
OXFORD RAILWAY STATION
PROPOSED FORECOURT AND ASSOCIATED WORKS
Arup Associates
Architects + Engineers + Quantity Surveyors
PROPOSED SITE PLAN
(Siteworks)
30MAR95
1:500
FJ3905-/02

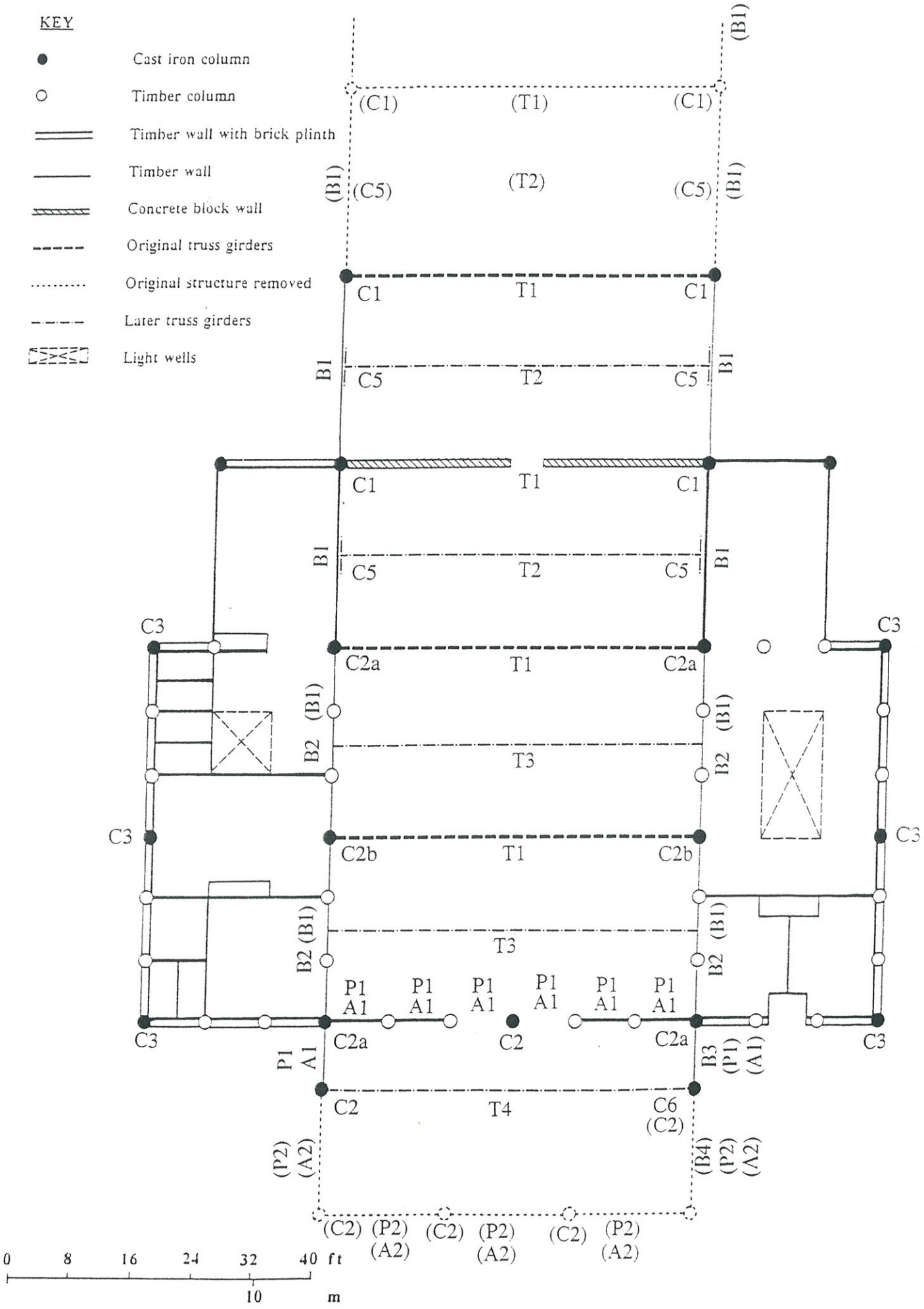


Fig. 1 Plan showing structural ironwork

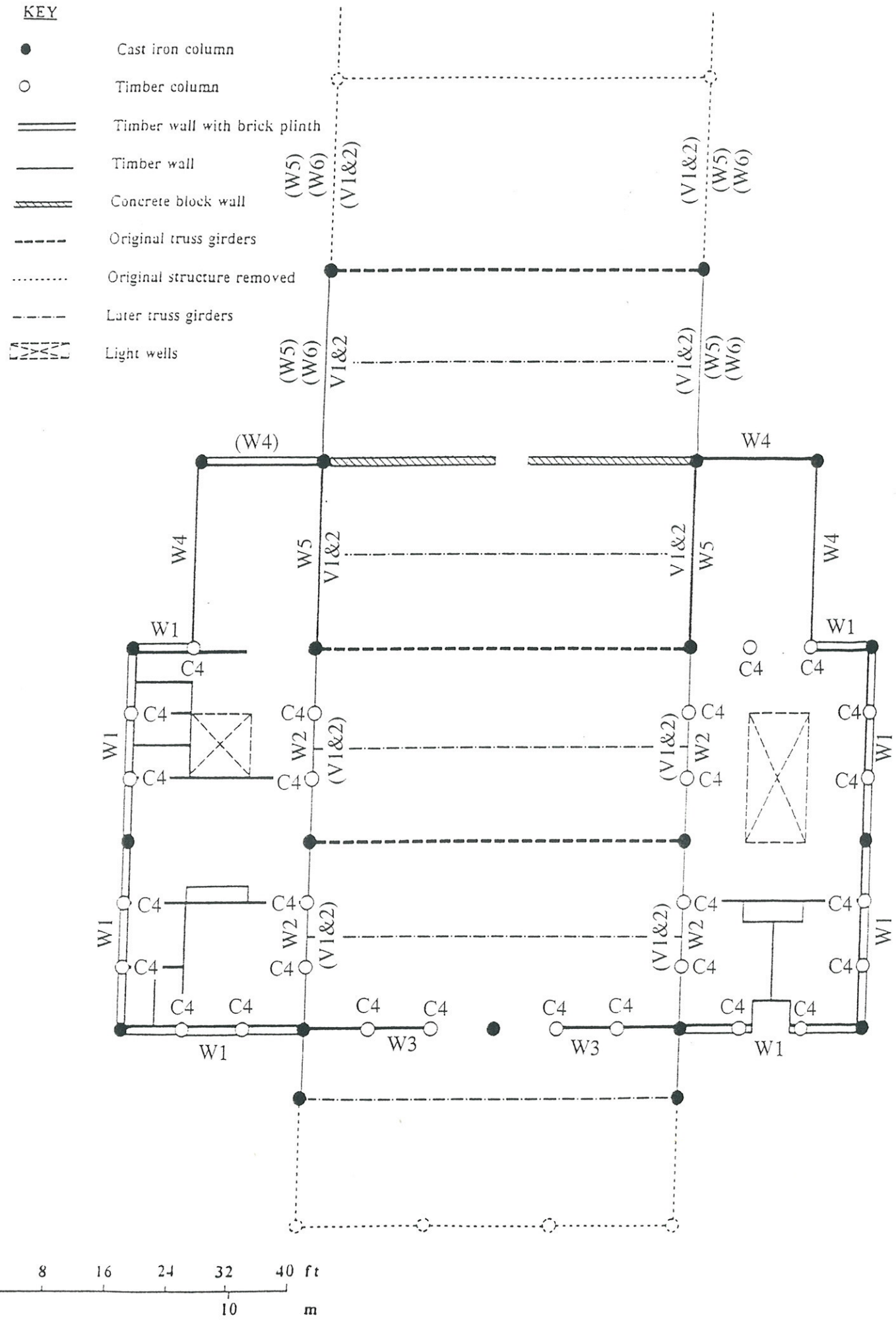


Fig. 2 Plan showing timber elements

KEY TO FIGS 1 & 2: DIAGRAMS OF IRON AND TIMBER ELEMENTS

A1	Cast iron arcade - decorative spandrels (8 ft long)
A2	Cast iron arcade - decorative spandrels (16 ft long)
B1	Side beam type 1 - cast iron
B2	Side beam type 2 - wrought iron
C1	Column type 1 - cast iron c.19 ft
C2	Column type 2 - cast iron 14 ft 10"
C2a	Column type 2a- cast iron 14 ft 10" with one gutter inlet
C2b	Column type 2b- cast iron 14 ft 10" with two gutter inlets
C3	Column type 3 - cast iron 14 ft 10" variant of last
C4	Column type 4 - timber column
C5	Column type 5 - rail-built 'A' frame
C6	Column type 6 - rolled steel, universal column section
E1	Extension to C1, C2, C2a and C2b
L	Wrought iron/steel lattice side beam, east side of canopy
P1	Cast iron panel - rectangle and circle (8 ft long)
P2	Cast iron panel - rectangle and circle (16 ft long)
T1	Truss type 1 - composite - wrought iron with cast iron uprights
T2	Truss type 2 - wrought iron/steel with gusset plates
T3	Truss type 3 - wrought iron/steel with gusset plates, spanning onto side beam
T4	Truss type 4 - wrought iron/steel with gusset plates, front of canopy
V1	Timber louvred ventilation panel (8 ft long)
V2	Timber louvred ventilation panel (16 ft long)
W1	Timber wall panel - main walls of side wings
W2	Timber wall panel - arcade beween concourse and side wings
W3	Timber wall panel - south wall of concourse
W4	Timber wall panel - external walls of low side wings
W5	Timber wall panel - between trainshed and low side wings
W6	Timber trainshed side screen

KEY

hidden features

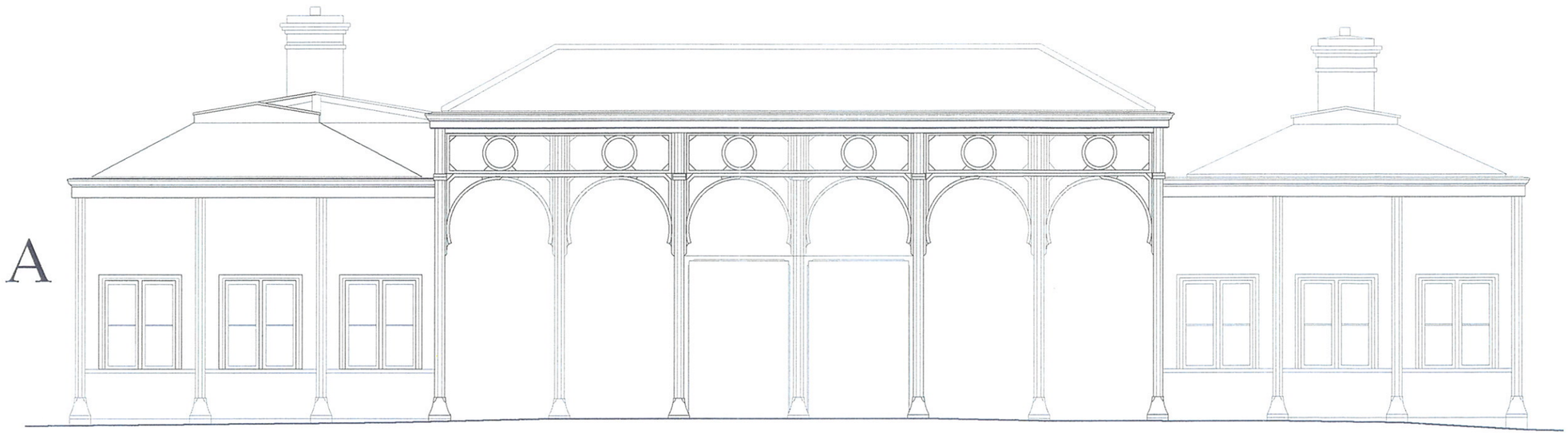
missing features

Phases I and Ia

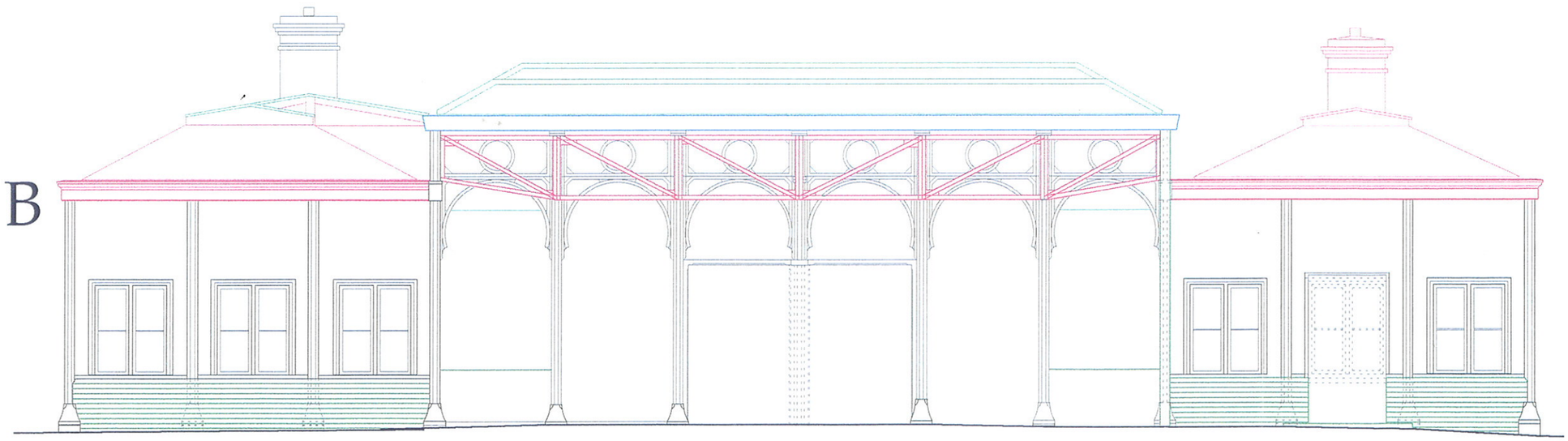
Phase II

Phase II

Phase IV



SOUTH ELEVATION (C.1914)



SECTION B-B

SOUTH ELEVATION

Former LMS Station Building
Rewley Road, Oxford.
South A & B
1:100 Record Drawings
Dwg No : 1597/10. March 1998
For Oxford Archaeological Unit

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KEY

hidden features

missing features

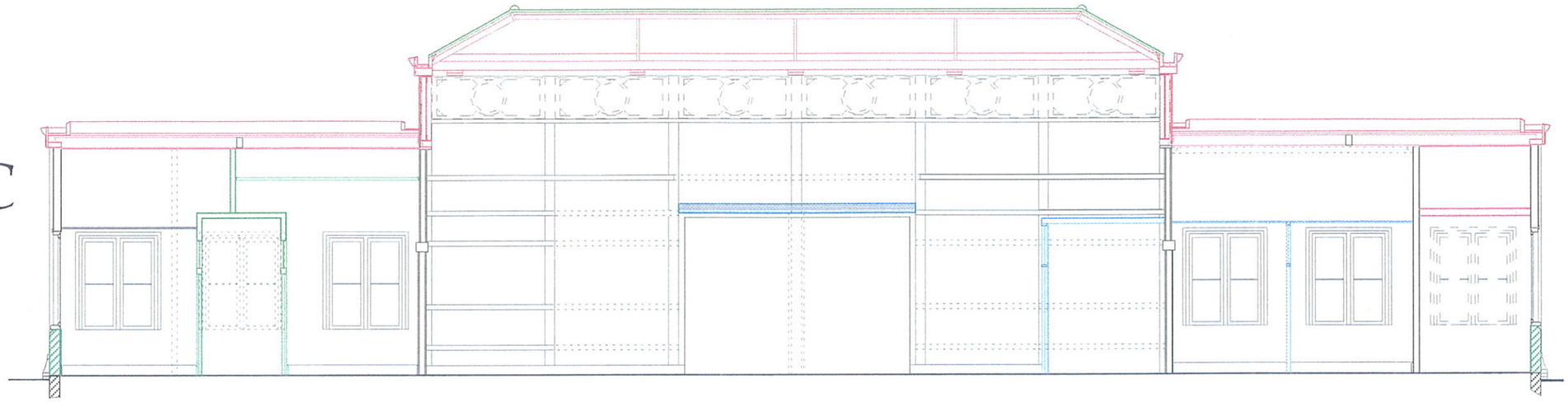
Phases I and Ia

Phase II

Phase II

Phase IV

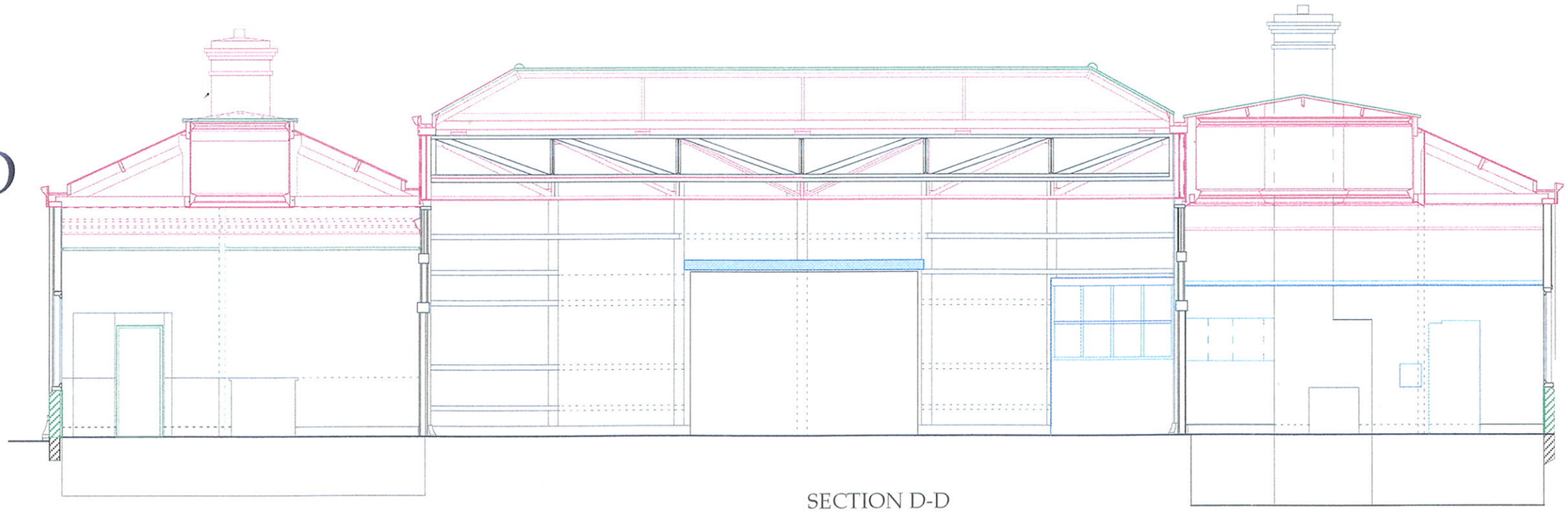
C



C

SECTION C-C

D



D

SECTION D-D

Former LMS Station Building
Rewley Road, Oxford.
Section C-C £ D-D
1:100 Record Drawings
Dwg No : 1597/11. March 1998
For Oxford Archaeological Unit

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KEY

hidden features

missing features

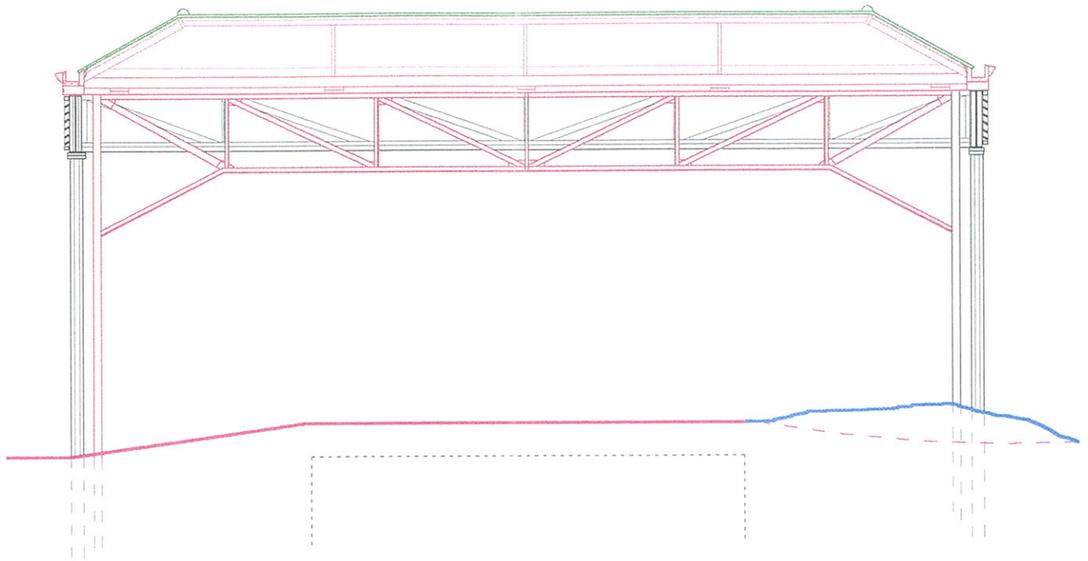
Phases I and Ia

Phase II

Phase II

Phase IV

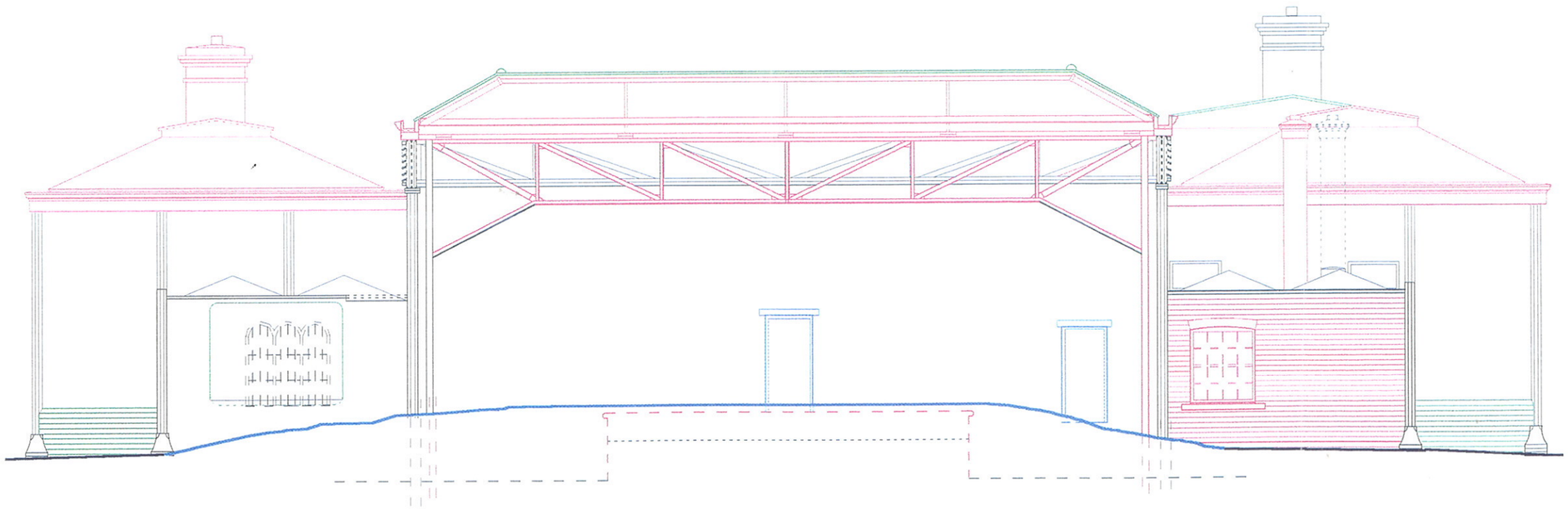
G



G

SECTION G-G

H



H

NORTH ELEVATION

Former LMS Station Building
Rewley Road, Oxford.
Section G-G and H-H
1:100 Record Drawings
Dwg No : 1597/13. March 1998
For Oxford Archaeological Unit

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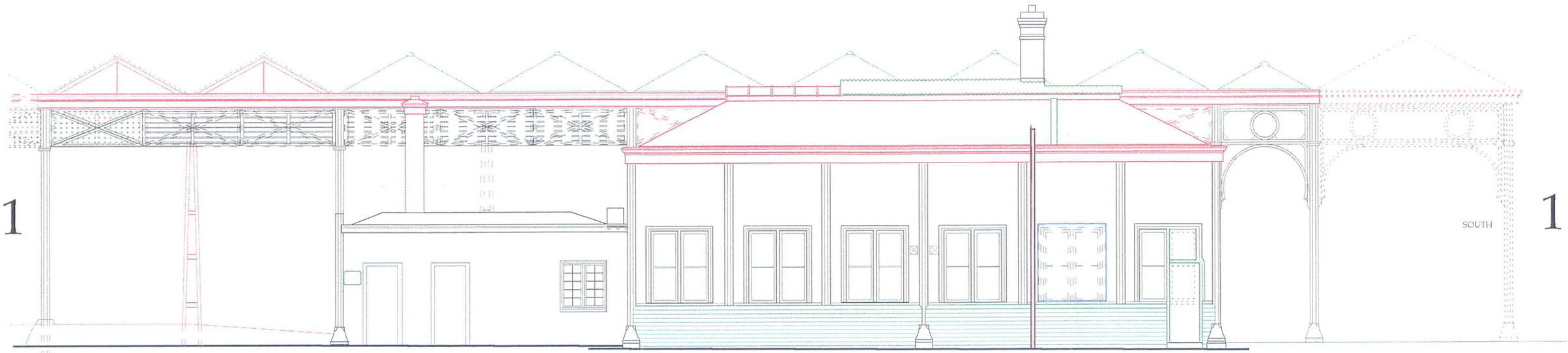

WEST ELEVATION

SECTION 2-2

Former LMS Station Building
Rewley Road, Oxford.
West Elevation & 2-2
1:100 Record Drawings
Dwg No : 1597/14. March 1998
For Oxford Archaeological Unit

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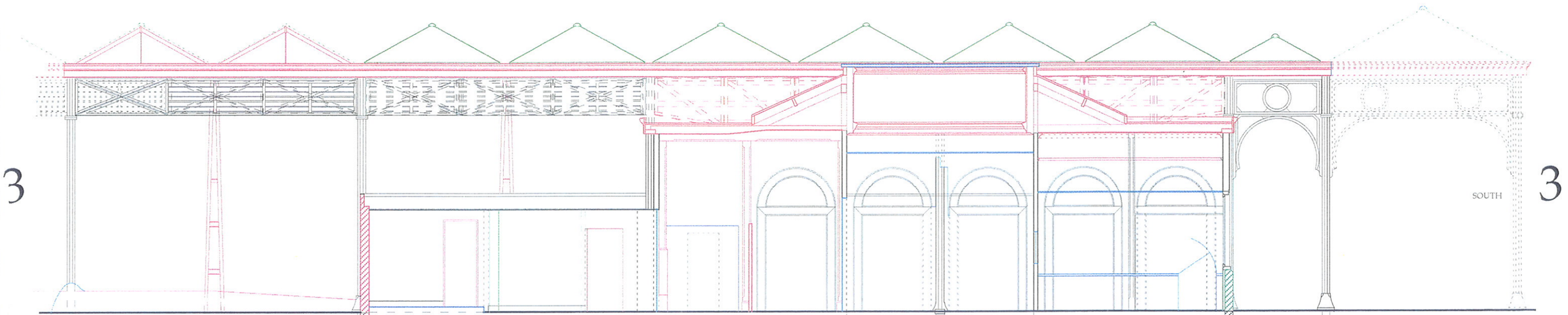

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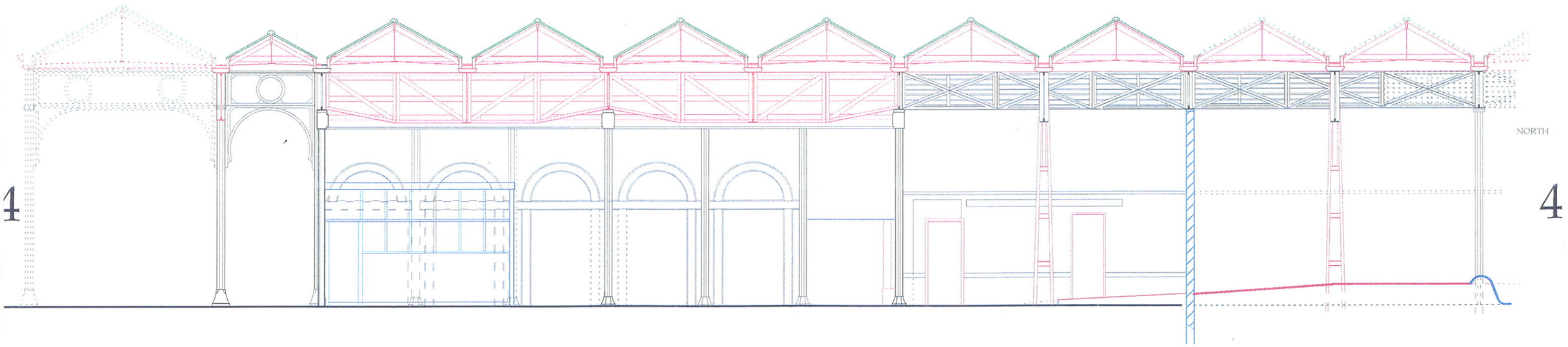

SECTION 4-4

Former LMS Station Building
Rewley Road, Oxford.
3-3 and 4-4
1:100 Record Drawings
Dwg No : 1597/15. March 1998
For Oxford Archaeological Unit

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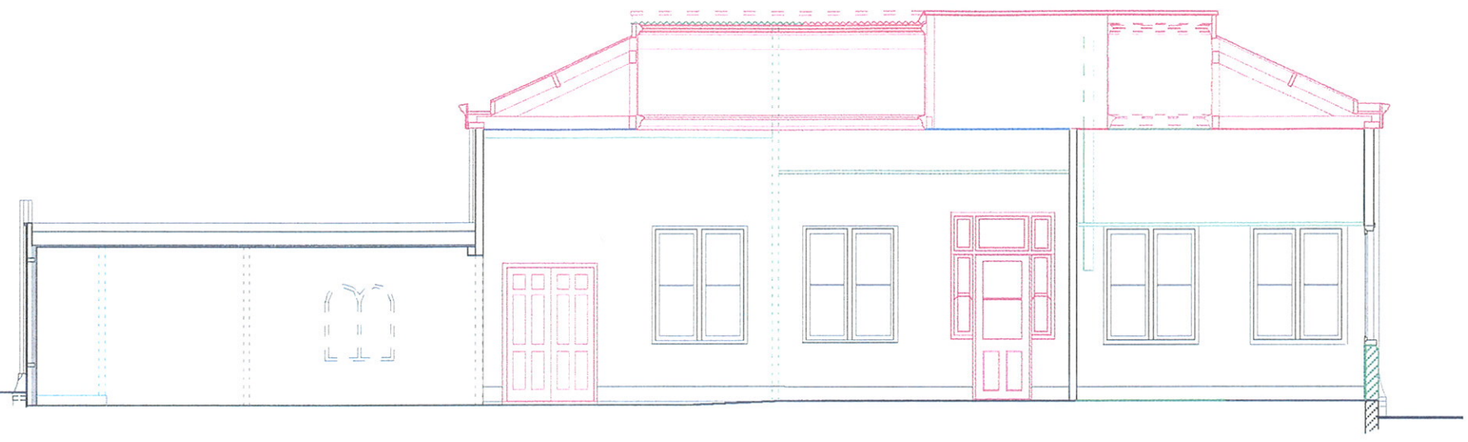
7



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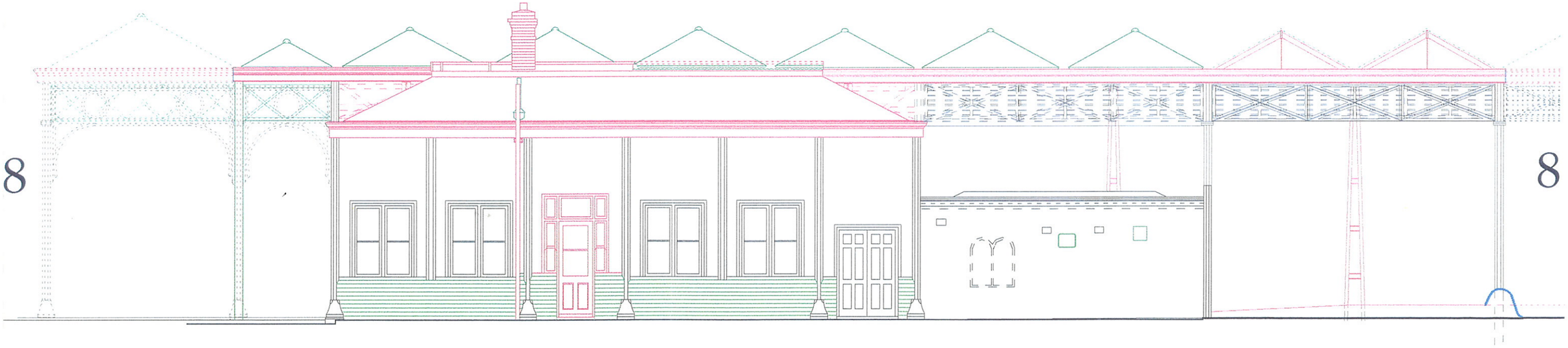
SECTION 7-7

8



8

EAST ELEVATION

Former LMS Station Building
Rewley Road, Oxford.
7-7 & EAST
1:50 Record Drawings
Dwg No : 1597/17. March 1998
For Oxford Archaeological Unit

CEW

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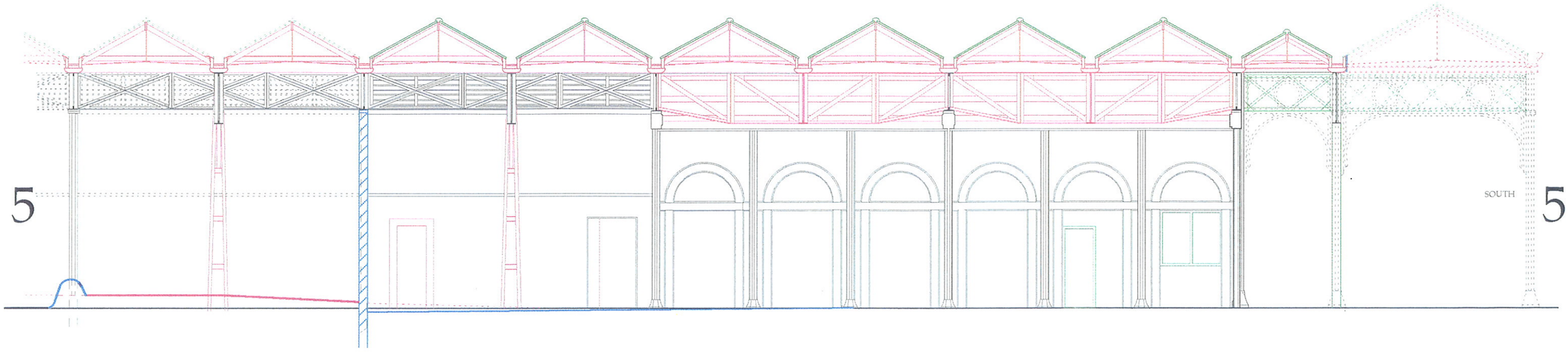
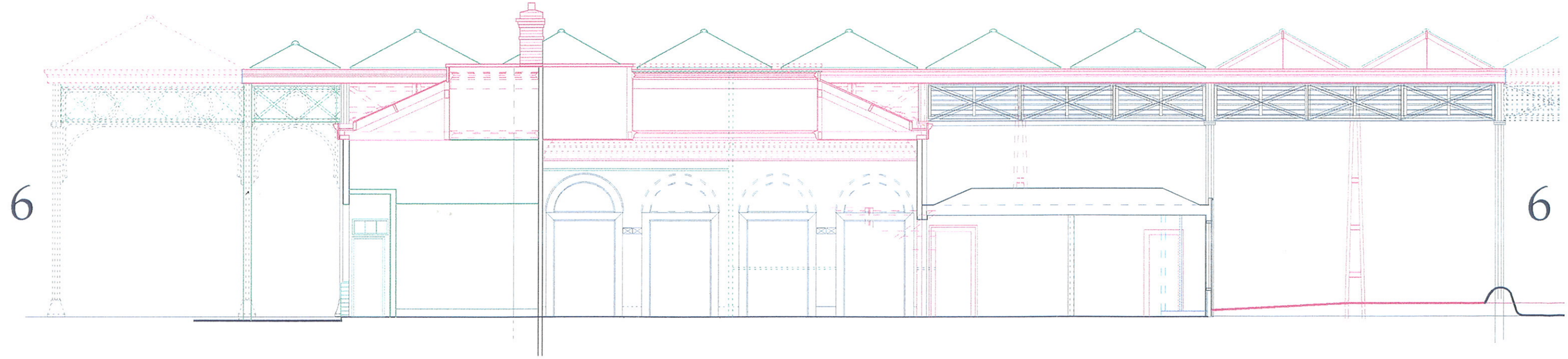


SECTION 5-5



SECTION 6-6

Former LMS Station Building
Rewley Road, Oxford.
5-5 & 6-6
1:100 Record Drawings
Dwg No : 1597/16 March 1998
For Oxford Archaeological Unit

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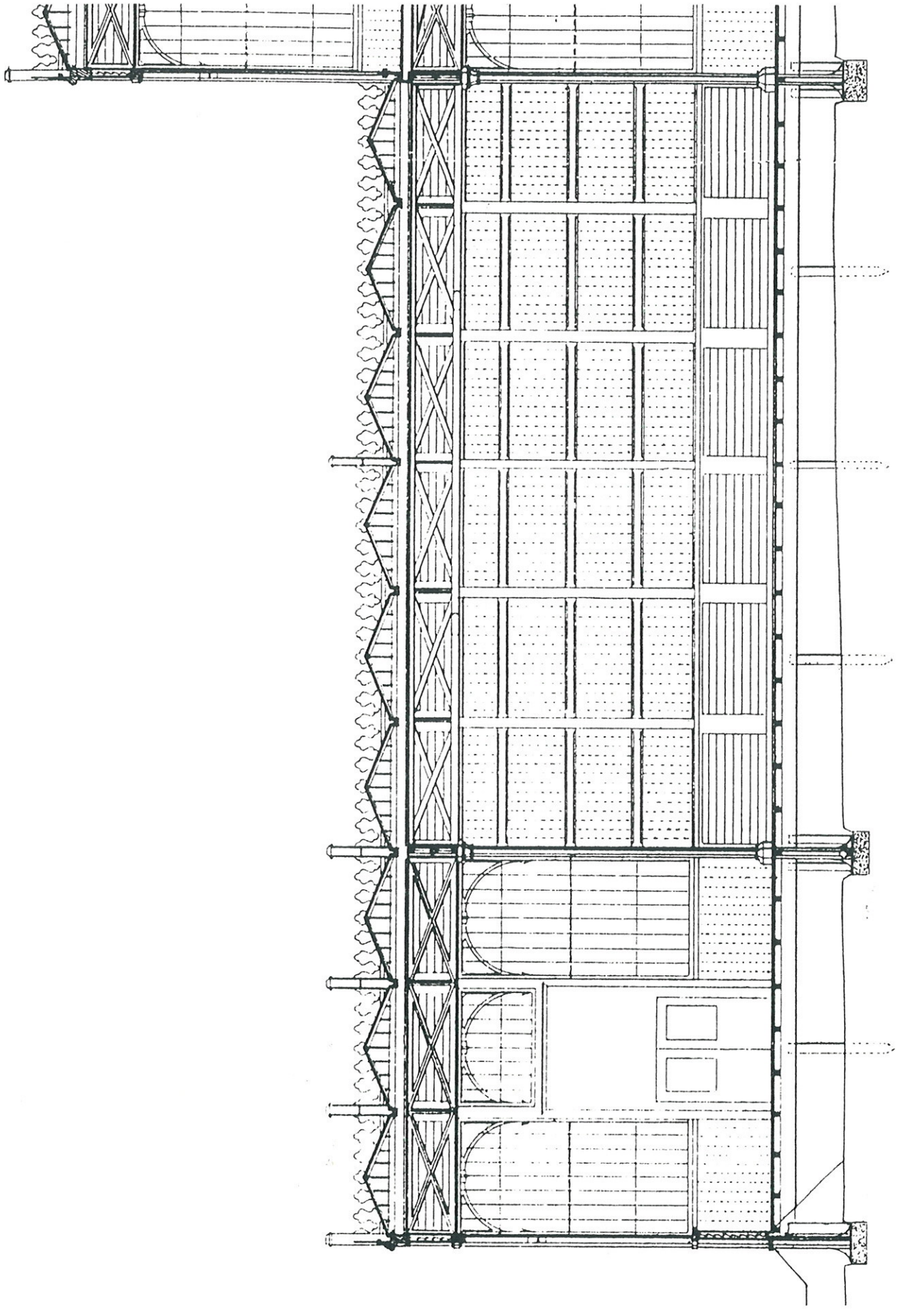
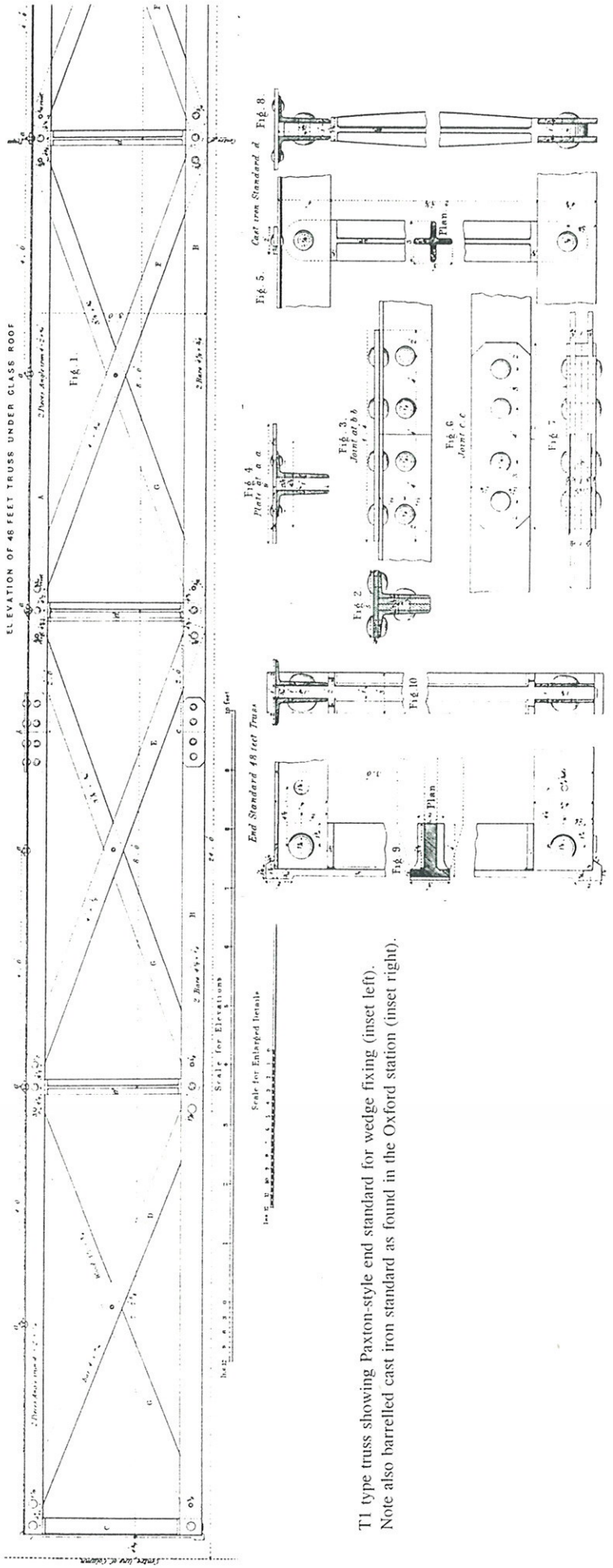
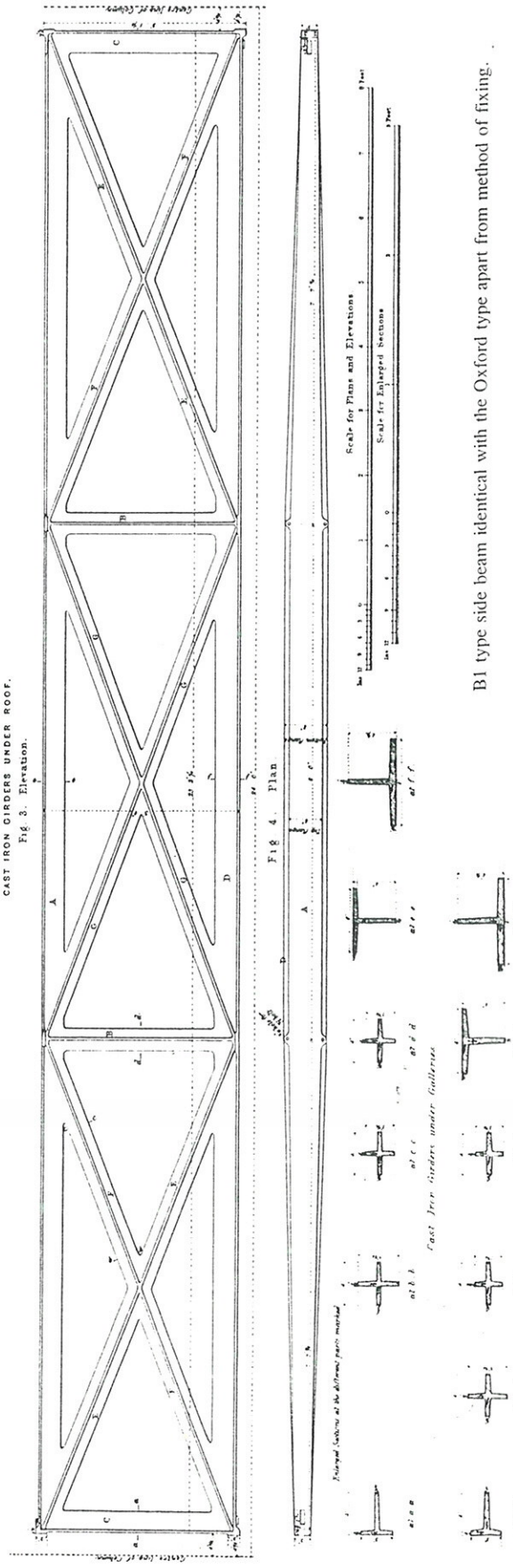


Fig. CP1 General section through single-storey wing of the Crystal Palace



T1 type truss showing Paxton-style end standard for wedge fixing (inset left).
Note also barrelled cast iron standard as found in the Oxford station (inset right).



B1 type side beam identical with the Oxford type apart from method of fixing.

Fig. CP2 Crystal Palace trusses and side beams

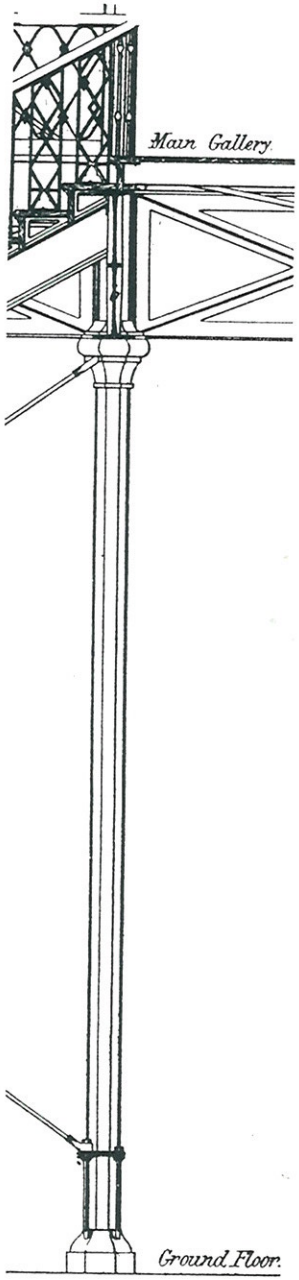
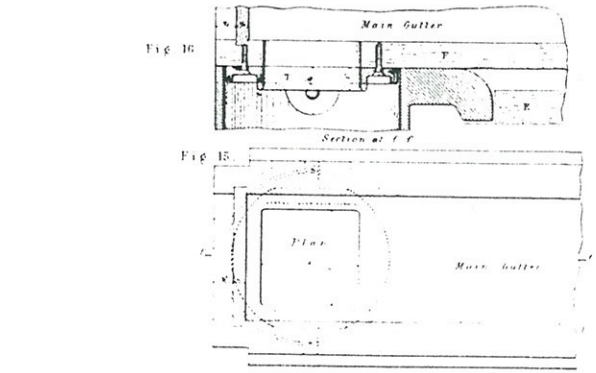


Fig. CP3 Crystal Palace columns

Assembled column



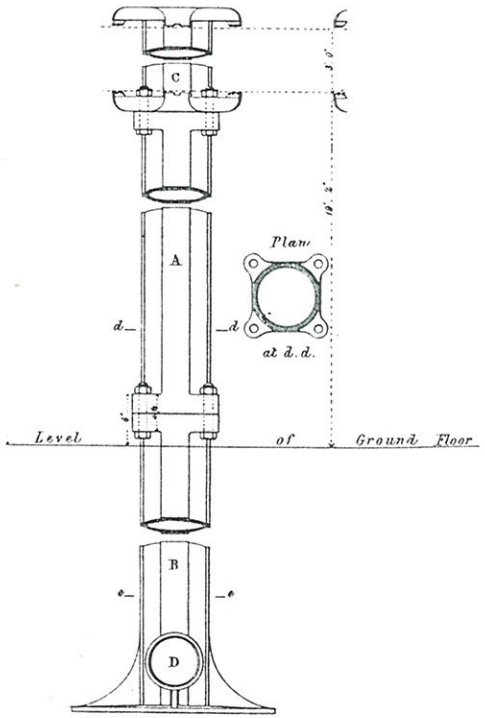
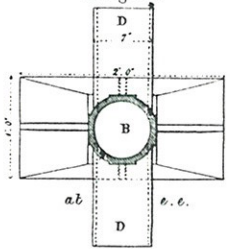


Fig. 3.



(Left) Standard components of single storey column with foundation column and extension column.

(Left) Detail of junction between extension column and gutter.
(Below) Details of Paxton wedge fixing.
(Right) Three-way union between two Paxton Gutters and a main gutter. Note difference between this and the C2a/C2b detail.

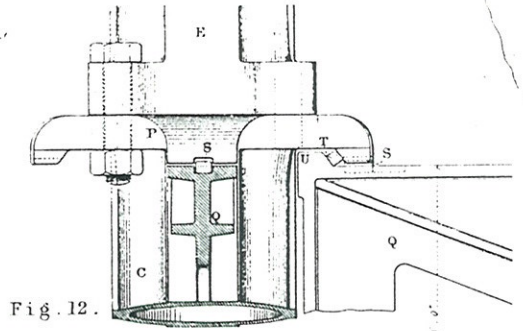


Fig. 12.

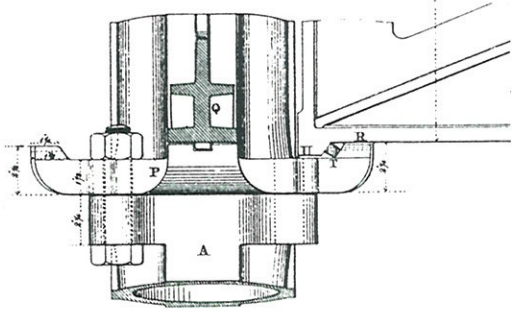
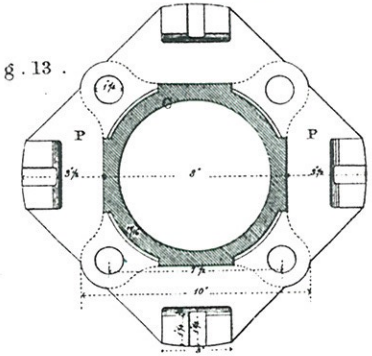
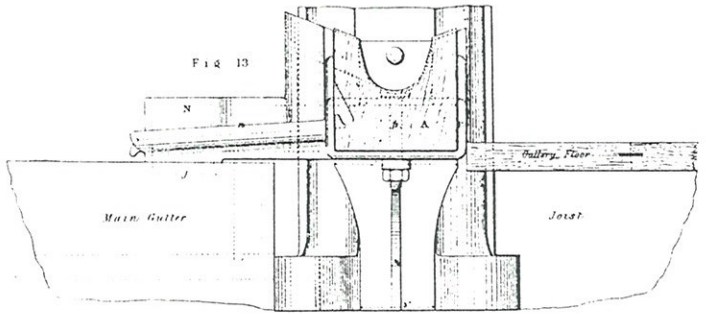
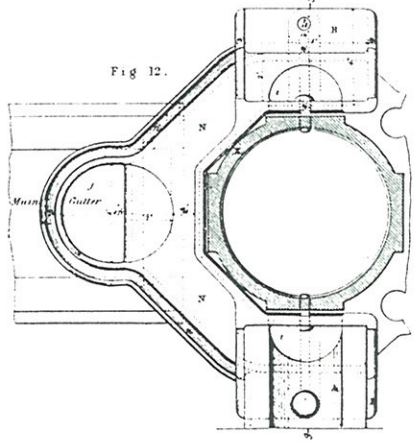
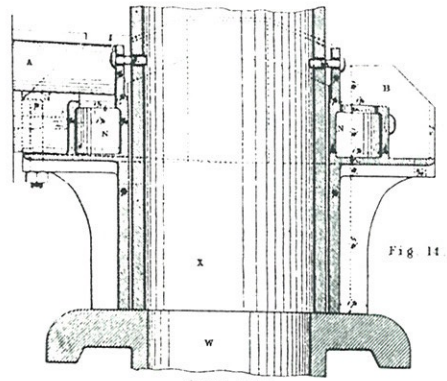


Fig. 13.









Scale for Elevations and Sectional Plans.

Scale for Enlarged Elevations and Plans.

COLUMNS

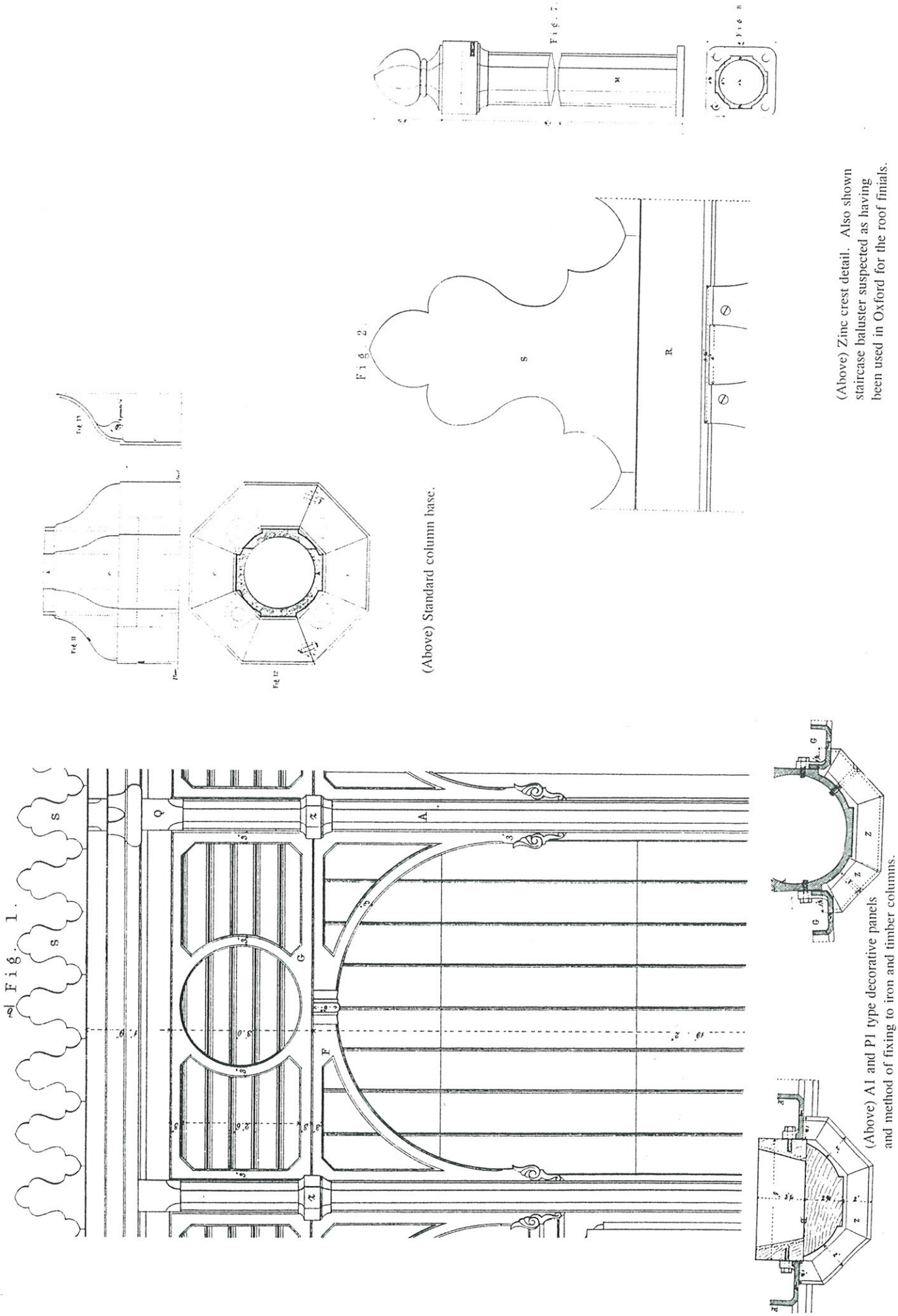


Fig. CP4 Crystal Palace cast iron decorative panel, column base, finials and crests

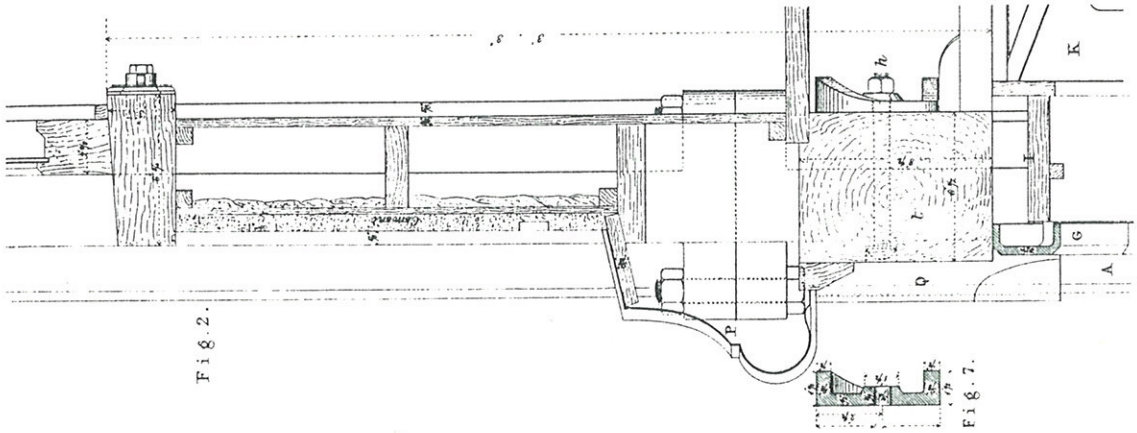


Fig. 2.

Fig. 7.

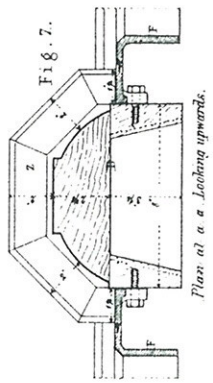
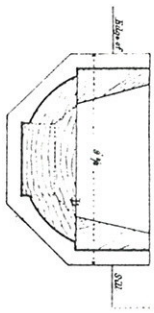


Fig. 7.

Plan at a Looking upwards.



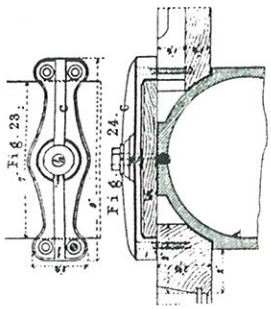
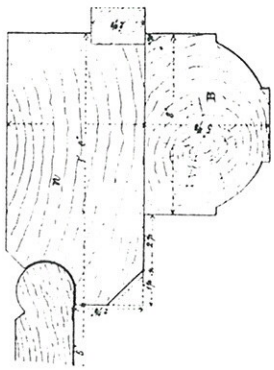


Fig. 23.

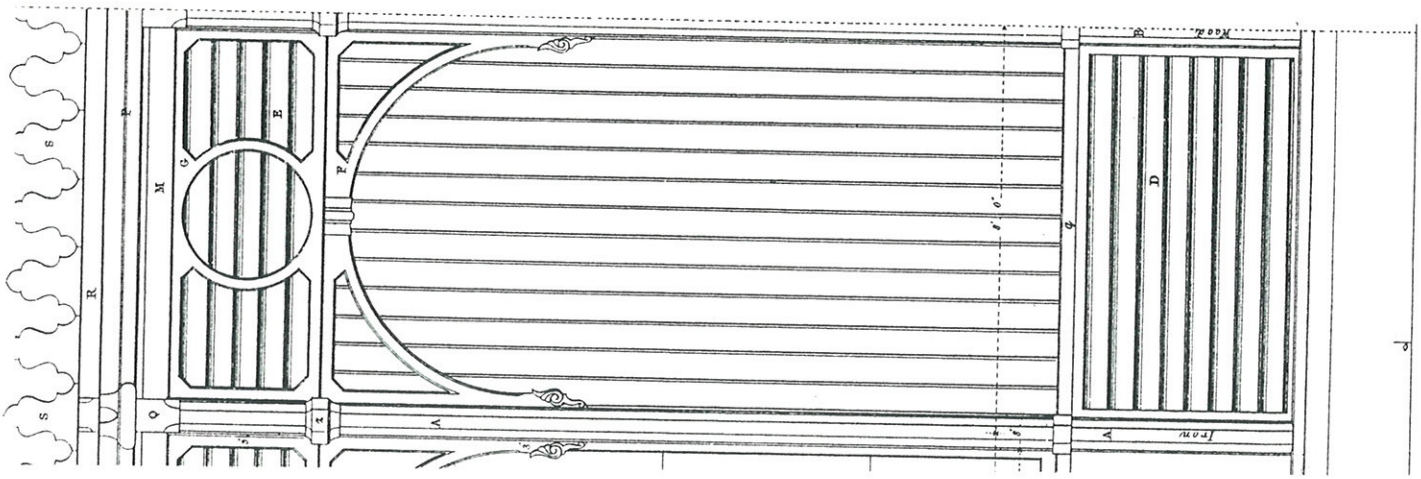
Fig. 24.



(Above left) Method of fixing timber panels to columns using cast 'butterfly'

(Above right) Cement-rendered timber panel detail

(Left) Standard timber wall panel



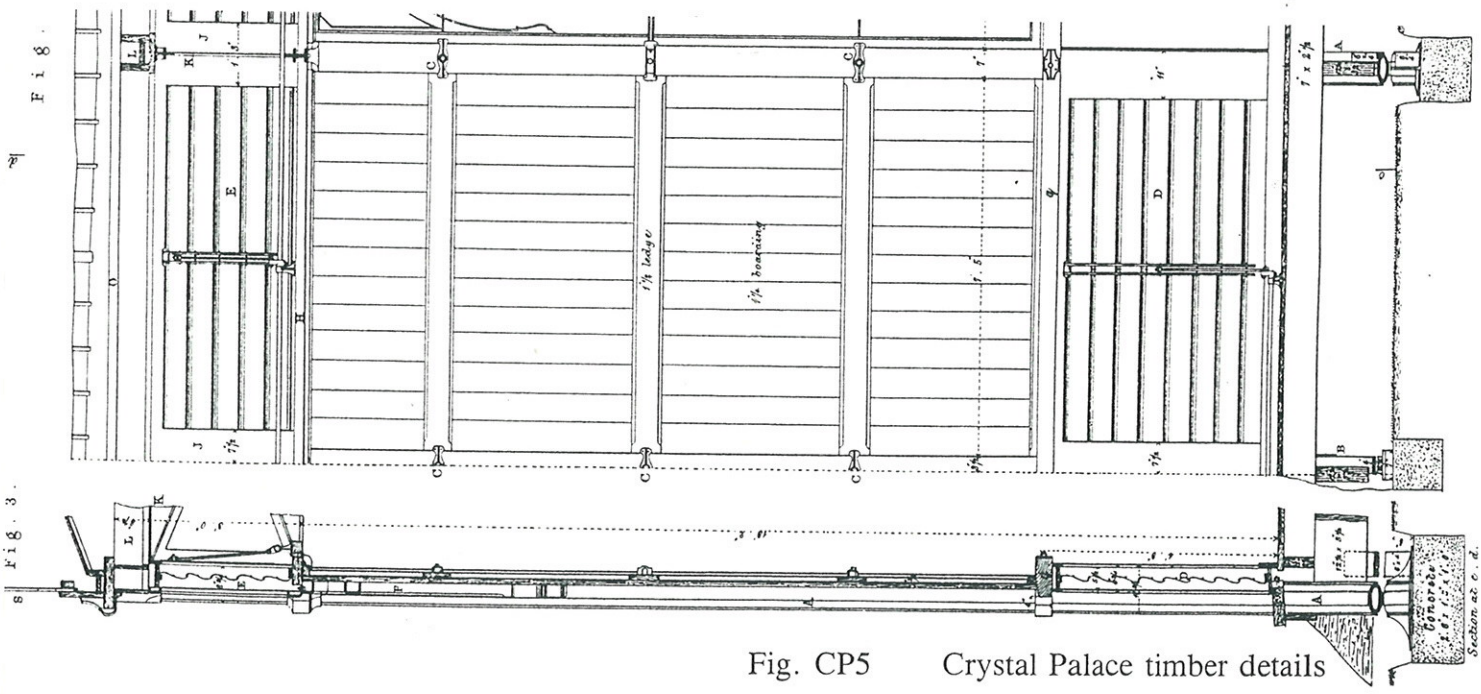


Fig. 3.

Fig. CP5 Crystal Palace timber details

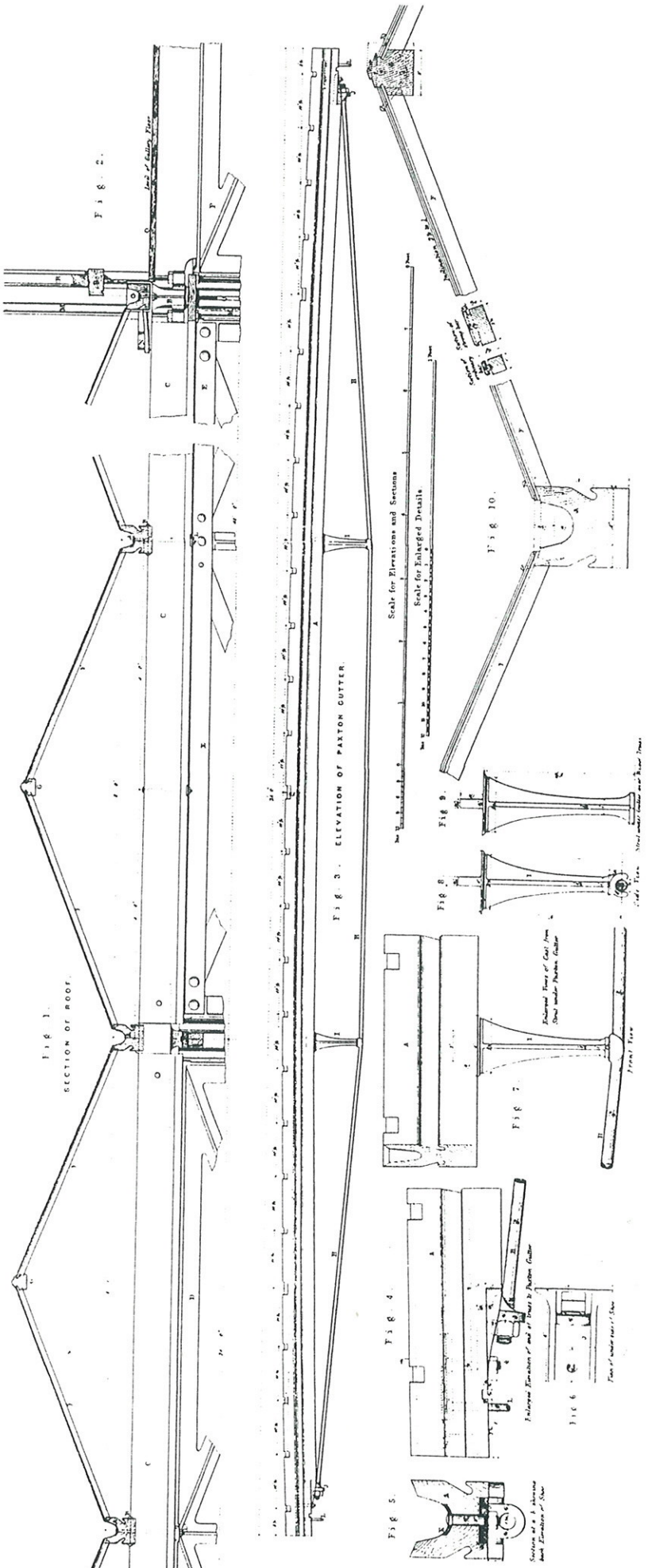


Fig. CP6 Crystal Palace Paxton gutter and roof details

Plate 1 The earliest known photograph of the LMS station, taken during the floods of 1875. whilst this view more clearly shows the original GWR station, the corner of the goods shed can just be glimpsed on the extreme right. The 'Crystal Palace' elements can be clearly seen including the decorative finials and crests. It is apparent that the roof is not that seen on later views. *(Minn collection, Bodleian Library)*

Plate 2 Another early view is this one showing the Oxford Volunteers marching to the GWR station in 1883. The porte-cochère of the station itself can be glimpsed on the extreme left. The original roof, finials and crests are again apparent. *(Minn collection, Bodleian Library)*

Plate 3 The earliest known view of the interior of the LMS station, probably taken c.1900. The original longitudinal ridge-and-furrow roof is apparent, as the louvred wooden ventilation panels, the secondary trusses and rail-built supports. Note the original trainshed side screens and the low platform with removable planked section. One of the rail-built supports is clearly shown obstructing the large doors in the side screens (extreme left). These doors and the removable platform section were originally for the siding which cut transversely through the trainshed. *(Brookside Photographic Services)*

Plate 4 The exterior of the LMS station in 1914 showing the porte-cochère. Note the later style of transverse ridge-and-furrow roof over the concourse/trainshed and the timber cladding of the side extending to ground level. *(Oxford County Libraries)*

Plate 5 The interior of the trainshed looking north, 1914. The transverse ridge-and-furrow roofing is clearly shown extending the full length of the trainshed. Note the raised platform level *(Oxford County Libraries)*

Plate 6 The interior of the trainshed looking south, 1919. *(NRM)*

Plate 7 Aerial view of the GWR and LMS stations, 1934. The extreme similarity between the roofs of the station and the goods shed (above) will be noted. The pitched-roofed section of the goods shed is a later LNWR-built extension. *(Aerofilms)*

Plate 8 The forecourt and porte-cochère of the LMS station. This, and the following three photographs are dated to early 1936 by the flag on Victoria Buildings opposite being flown at half mast, marking the death of George V in January of that year. *(BR/OPC)*

Plate 9 The LMS station from the south-east, 1936. Note the doorway inserted into the centre of the south wall of the east wing. *(BR/OPC)*

Plate 1 The station from the south, 1936. *(BR/OPC)*

Plate 11 The goods shed from the south-east, 1936. The louvred wooden ventilation panels below the roof can be clearly seen *(BR/OPC)*

Plate 12 The LMS station, 1st May 1940, clearly showing clearly the roofs of both the trainshed etc as well as of the flanking wings. This, and the following three photographs, appear to have all been taken on the same day. *(NRM)*

Plate 13 The free-standing Booking Office from the south-east, 1940? It is said that this was originally used at the Great Exhibition of 1851 and it is worth noting that the panelling and the ornate crests exactly copy elements used in both the Crystal Palace and the Oxford Station. This structure is absent the 1876 OS plan and the 1903 tracing of the station which show the Booking Office as being a room in the eastern wing. This structure is visible however, in the early un-dated photograph of the station interior (plate 3). *(NRM)*

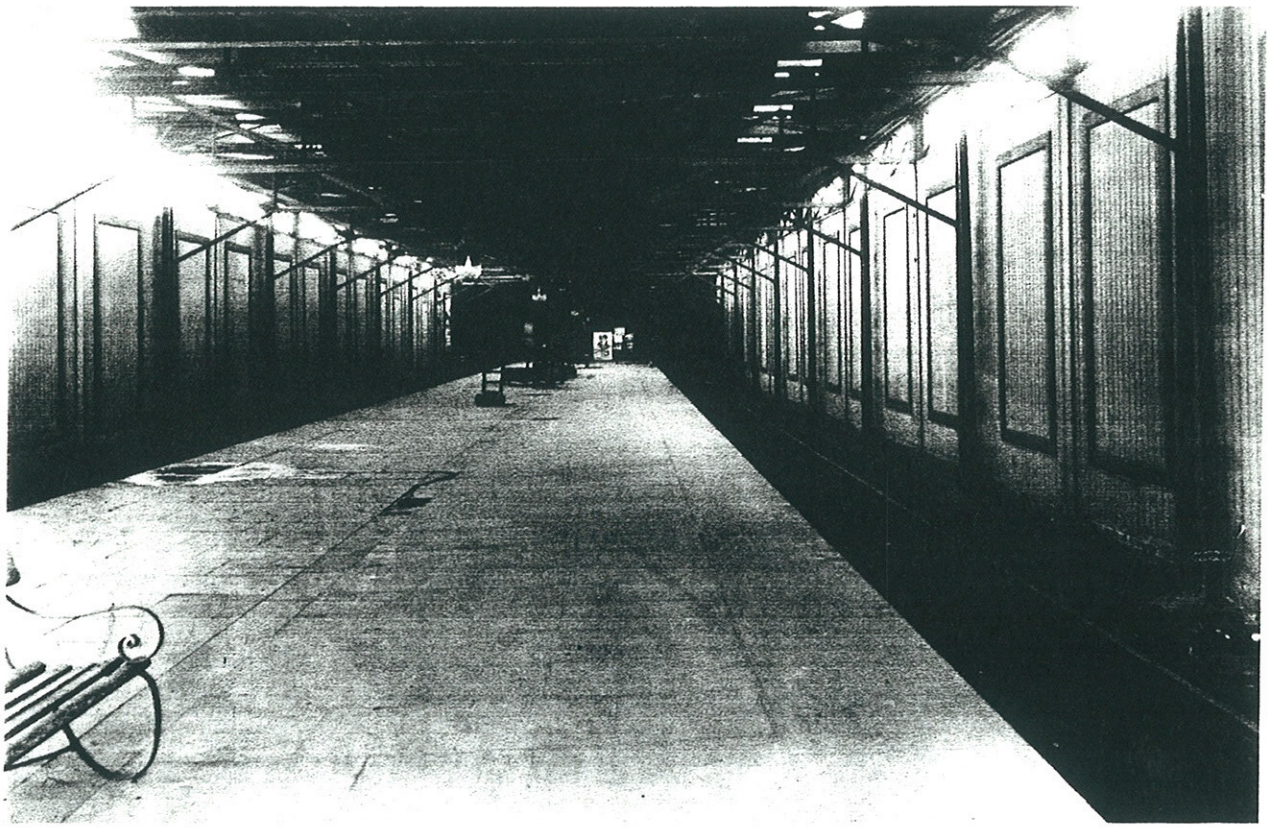


Plate 14 The interior of the trainshed looking south, 1940? Note the later style of side screens. *(NRM)*

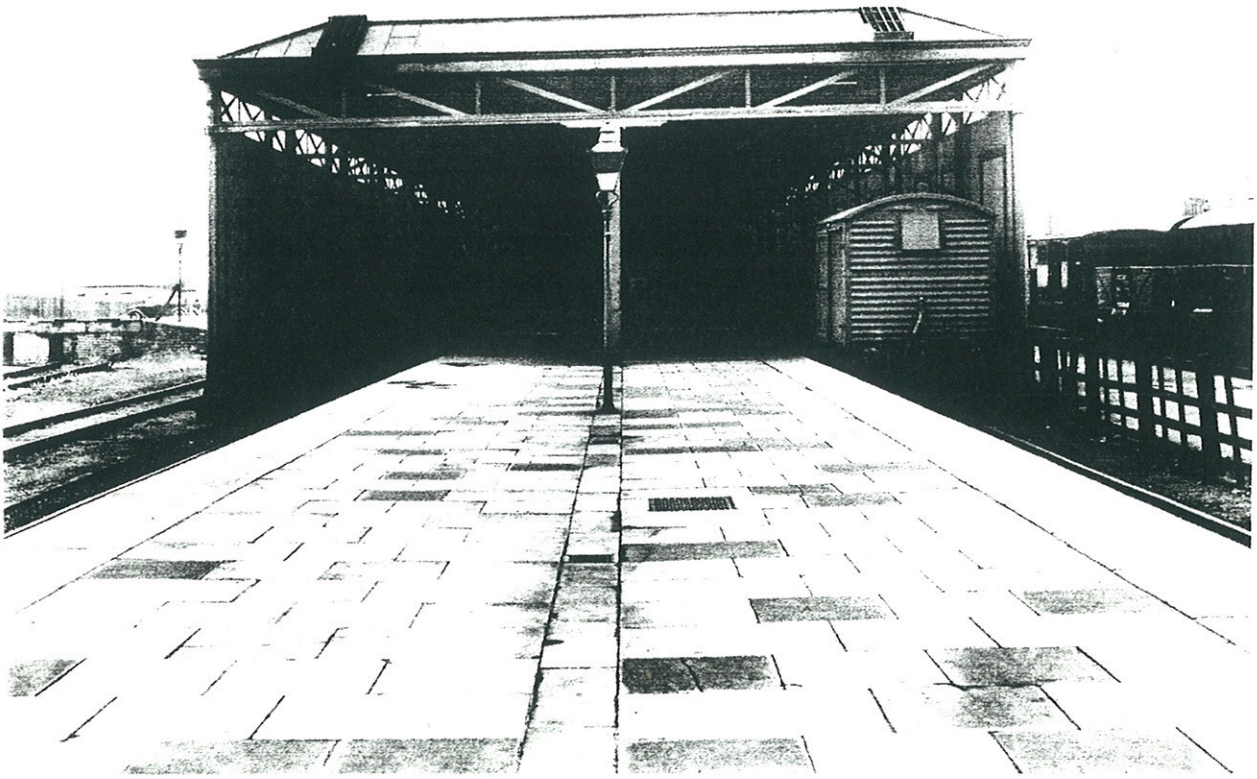


Plate 15 The train-shed from the north, 1940? *(NRM)*

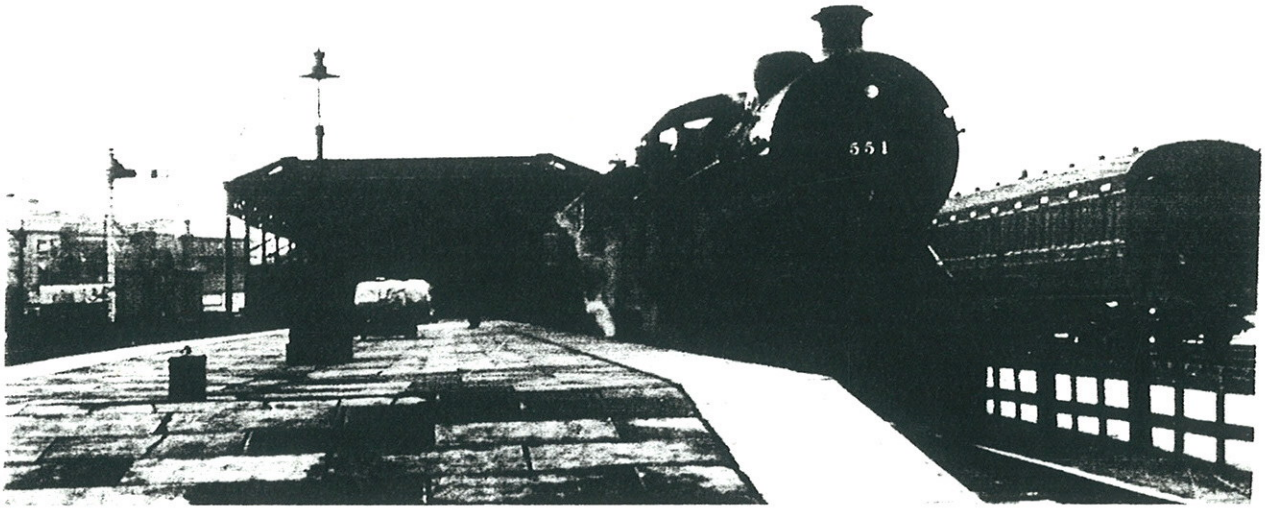


Plate 16 The trainshed from the north, 11th February, 1948. Note the removal of many of the trainshed side screens and much of the glass from the roof. *(H.C. Casserley)*

Plate 17 Exterior of the station from the south, 1949. *(NRM)*

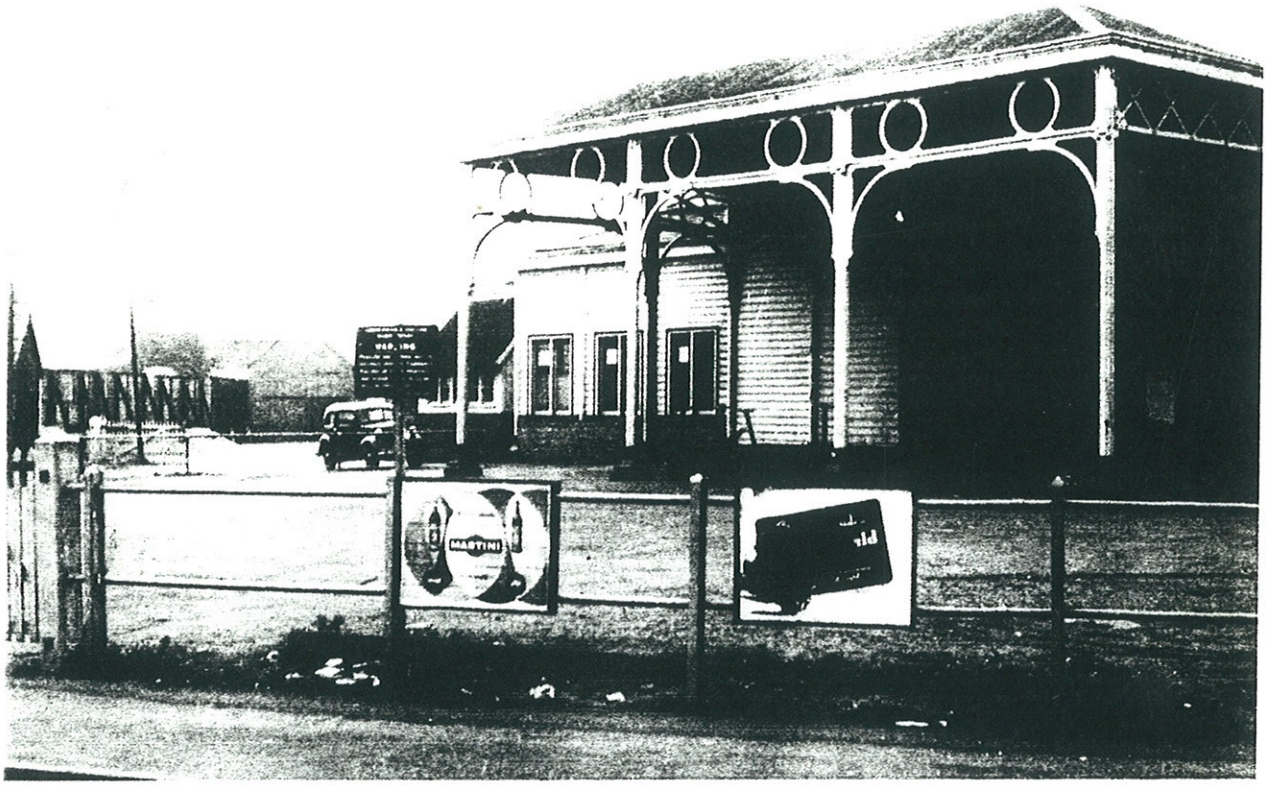


Plate 18 The south elevation just before closure, 4th October, 1951. The construction of the porte-cochère can be clearly seen, as can the replacement lattice girder (extreme right). Note also the inserted brick plinths, visible in the walls of the flanking wings for the first time. *(The Late Dr. Parkes Collection)*

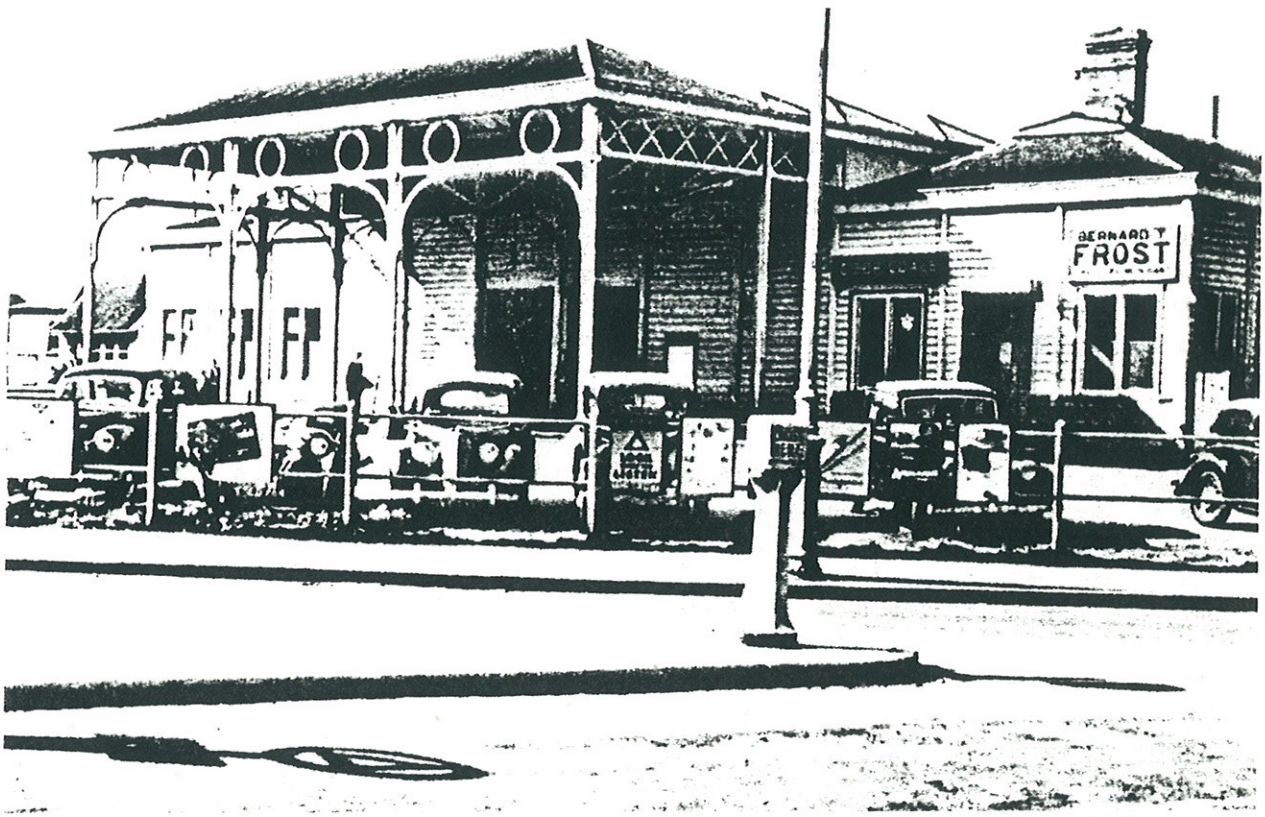


Plate 19 A similar view, also taken in 1951, showing more clearly the replacement lattice girders and rolled steel column supporting them. *(Dr. R. Preston Hendry & R. Powell Hendry)*

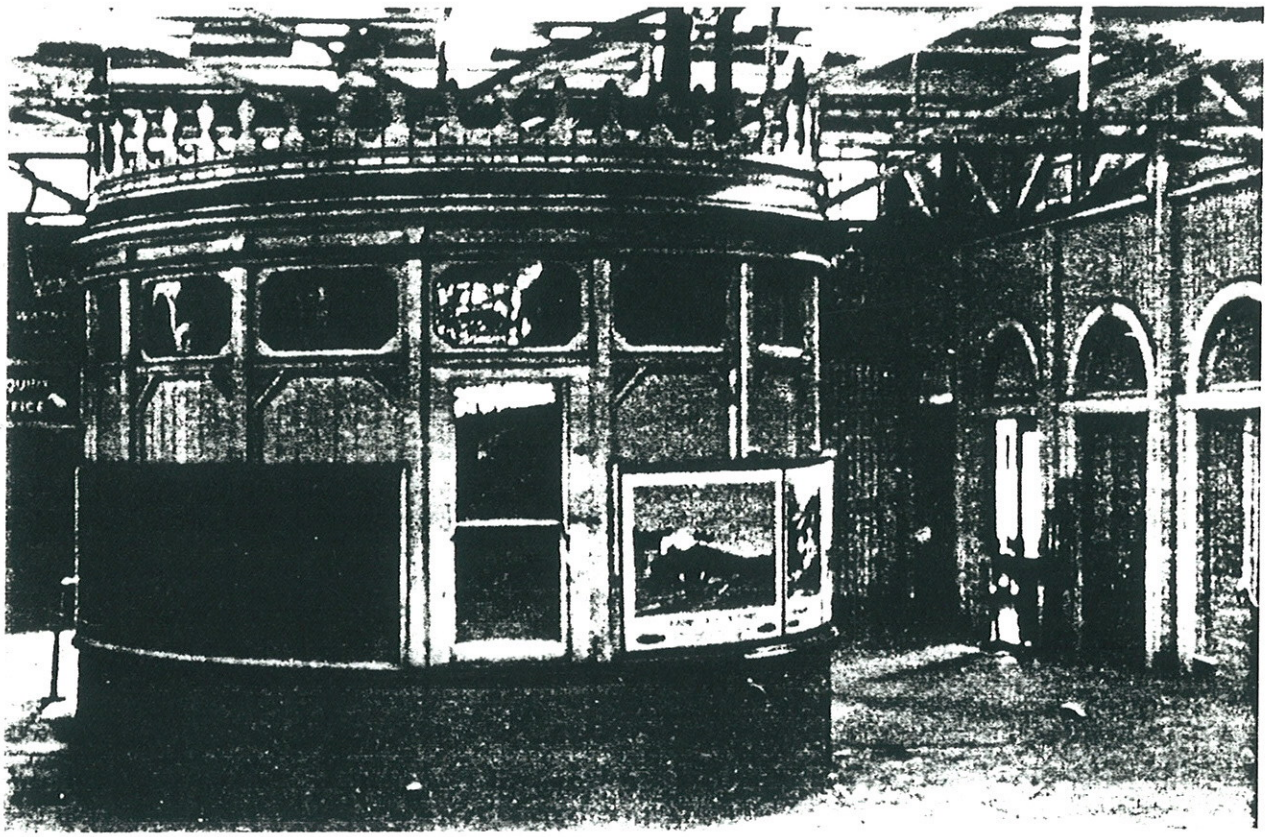


Plate 20 The Booking Office from the north, 1951. The arcading on the right is shown as it was before the erection of tyre centre office in the south-west corner of the concourse. *(Dr. R. Preston Hendry & R. Powell Hendry)*

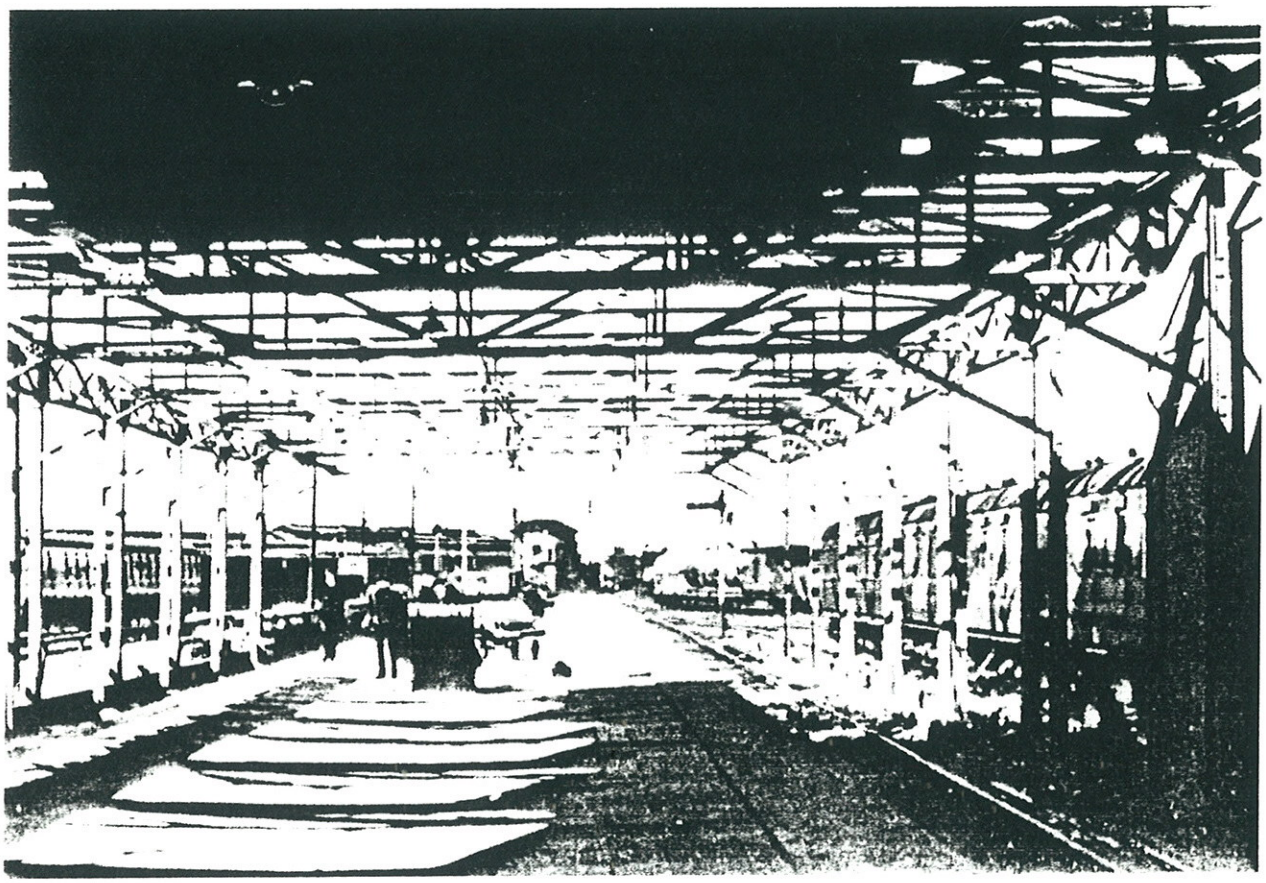


Plate 21 The interior of the trainshed, looking north, 1951. The roof covering over the northernmost five and a half bays appears to be in the course of removal. *(Dr. R. Preston Hendry & R. Powell Hendry)*

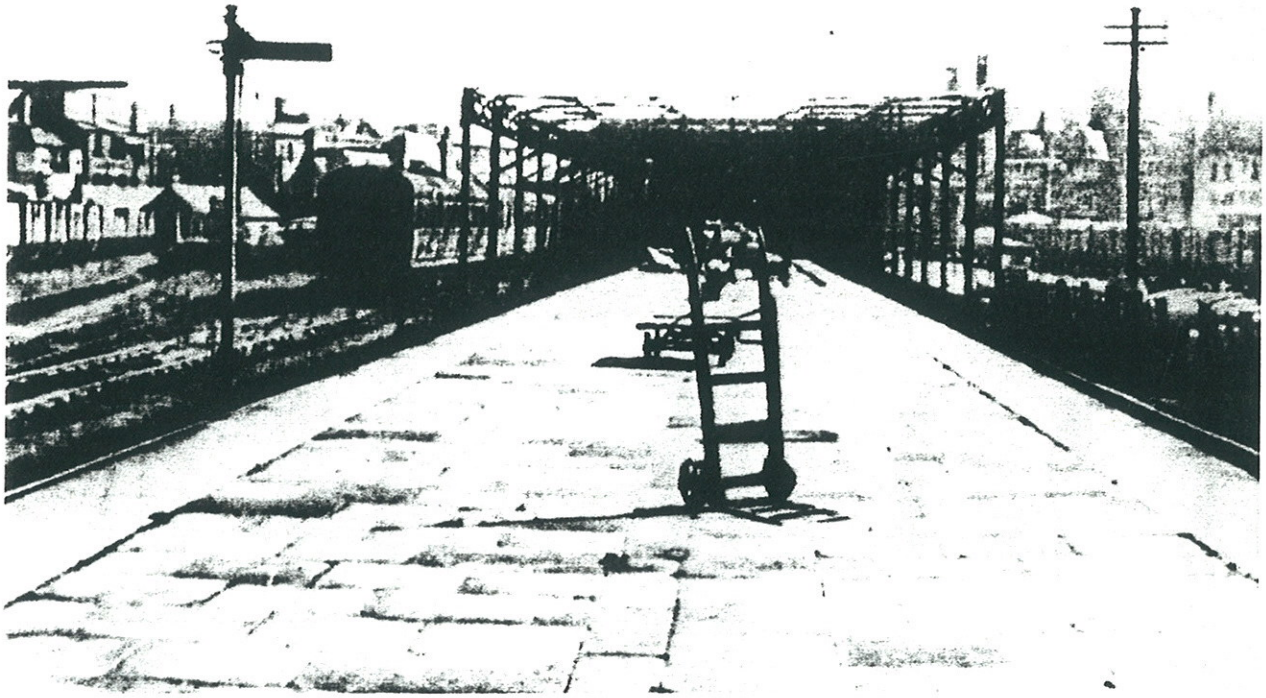


Plate 22 The trainshed from the north, 1951. *(Dr. R. Preston Hendry & R. Powell Hendry)*

Plate 23 The interior of the trainshed looking north, 22nd September 1951, merely a couple of weeks before closure to passengers. *(The Late Dr. Parkes Collection)*

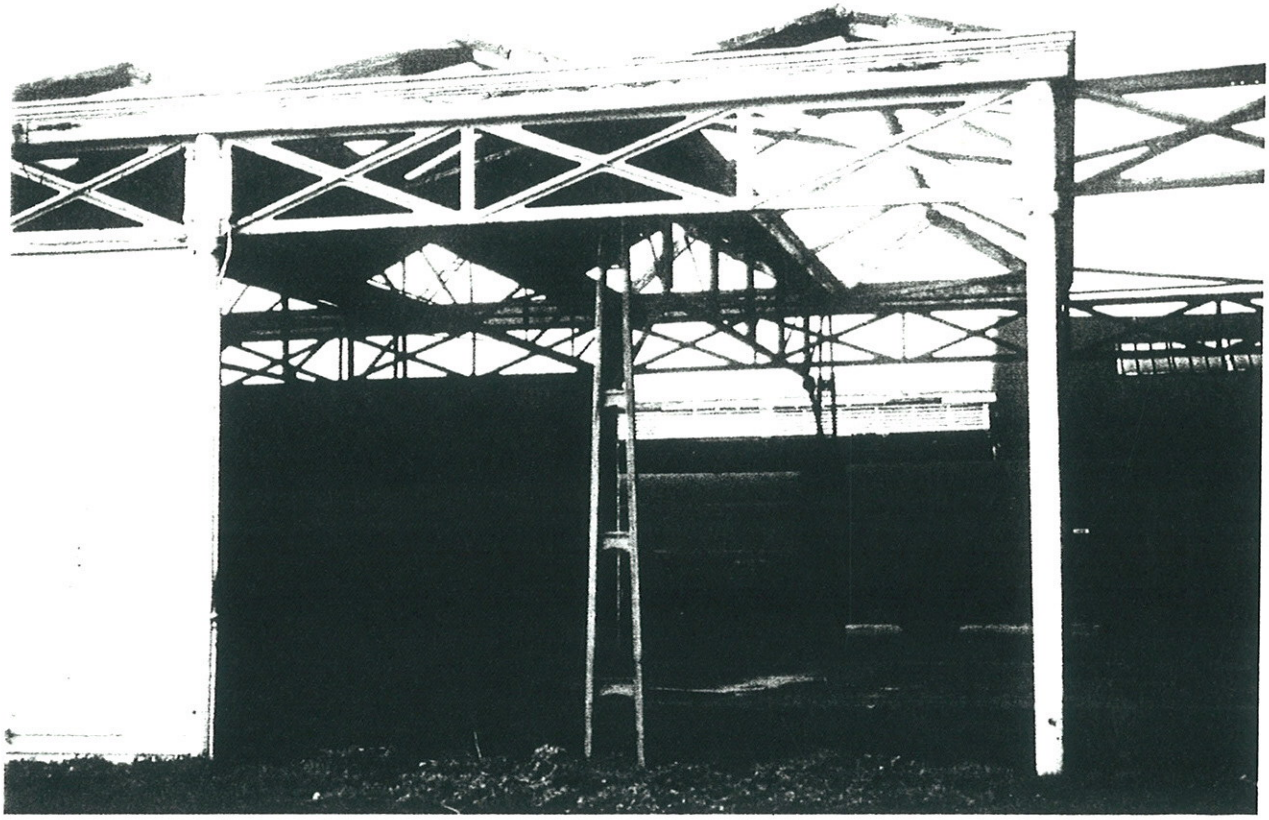


Plate 24 View of one bay of the trainshed in 1966, showing typical columns, extension columns, side beams, later side screens (W6) and inserted truss on rail-built supports. Visible in the background are the two phases of goods shed, the earlier part on the left clearly showing its iron columns and wooden louvre panels, both matching those of the trainshed itself. *(Arnold Pacey)*

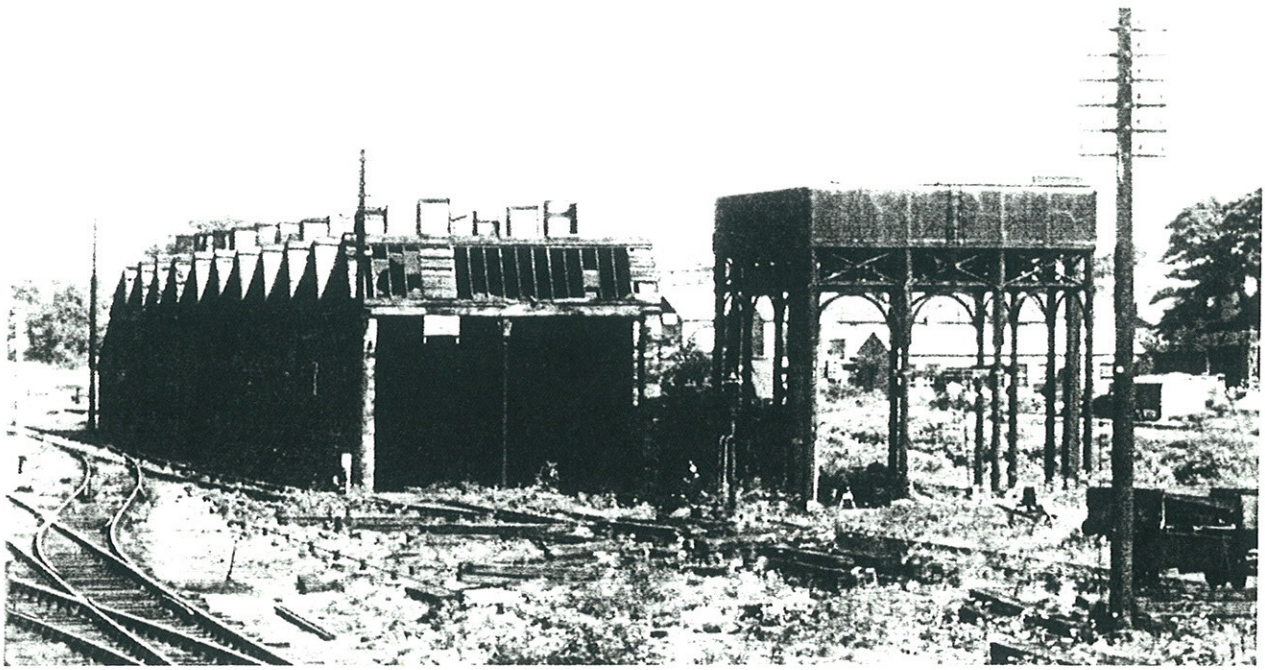


Plate 25 The water tower and the later north-lit two-road locomotive shed in 1959. The 'Crystal Palace' elements of the latter are readily apparent. The original three-road locomotive shed was condemned in 1883, partly as a result of recurrent problems with its roof. It is speculated that the original locomotive shed was built using the same kit of parts as the station, goods shed and the water tower. *(J.D. Edwards)*

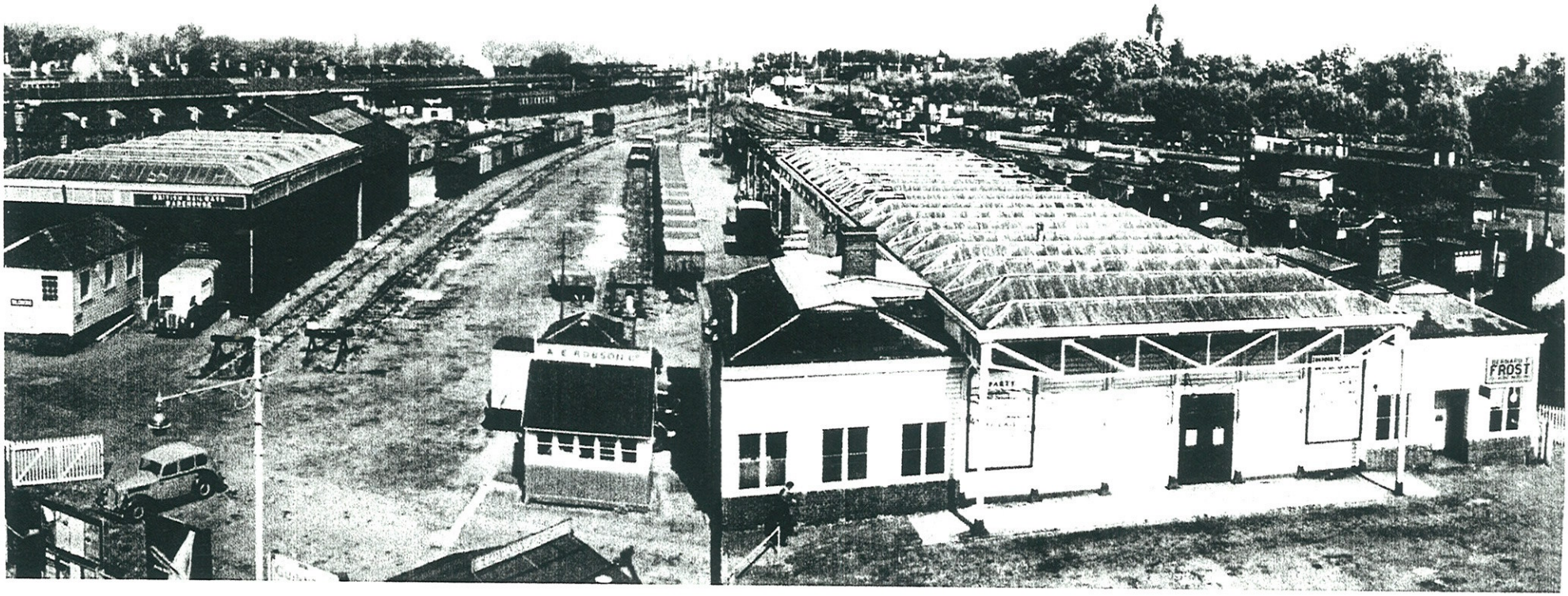


Plate 26 The station and goods shed from the south, probably also taken in 1959, when the station was in use as a goods depot and lodgings. The partial removal of the porte-cochère will be noted however, the central column in the south elevation is still intact. *(J.D. Edwards)*

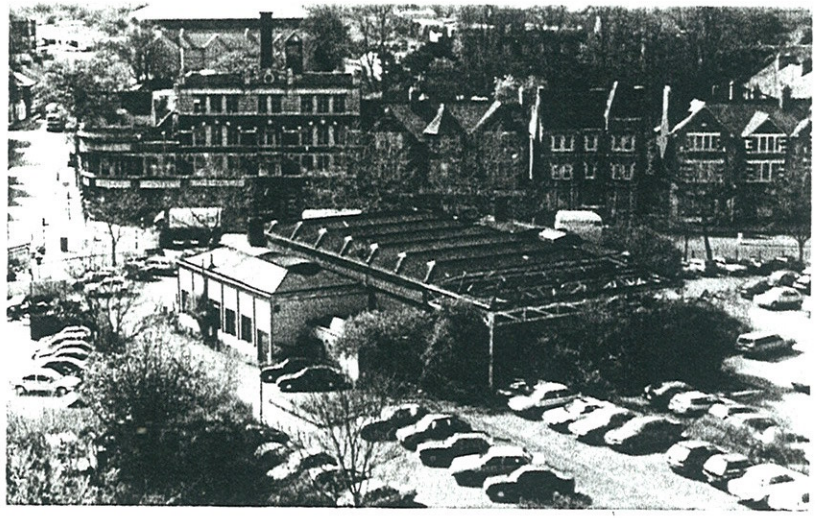


Plate 27 Aerial view of the former station from the north-east.

Plate 29 Interior view from the south, showing primary (shallow) and inserted secondary (deep) trusses. Despite the varying lengths of the different trusses, the vertical standards (members) all align, marking the sites of the former longitudinal valley gutters.

Plate 28 South elevation from the south-east showing truncated column in doorway and the remaining portion of the porte-cochère.

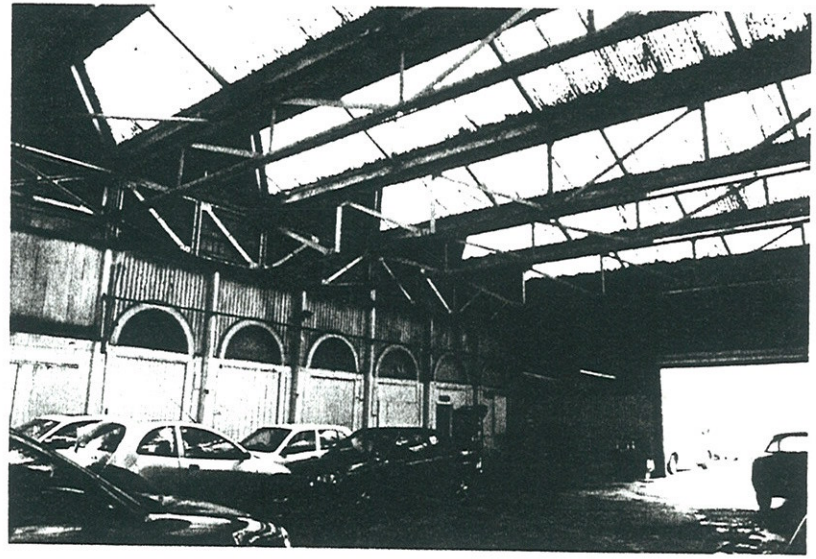


Plate 30 Interior view from the north-west, showing original and inserted side beams and trusses and the original corrugated iron lining to the walls of the concourse.

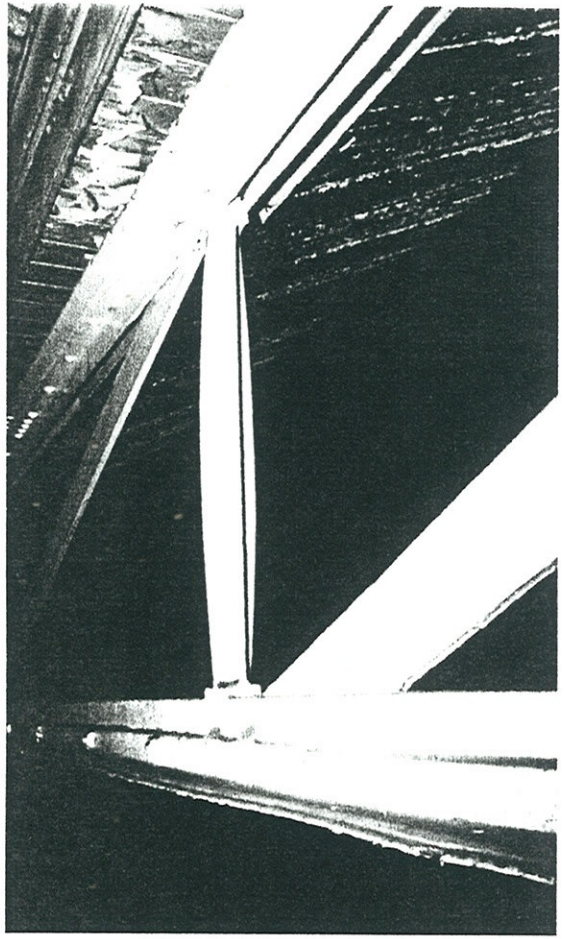


Plate 31 Detail showing the construction of the primary T1 trusses showing typical cruciform cast iron vertical standard as used in the Crystal Palace. (Compare with Fig CP2).

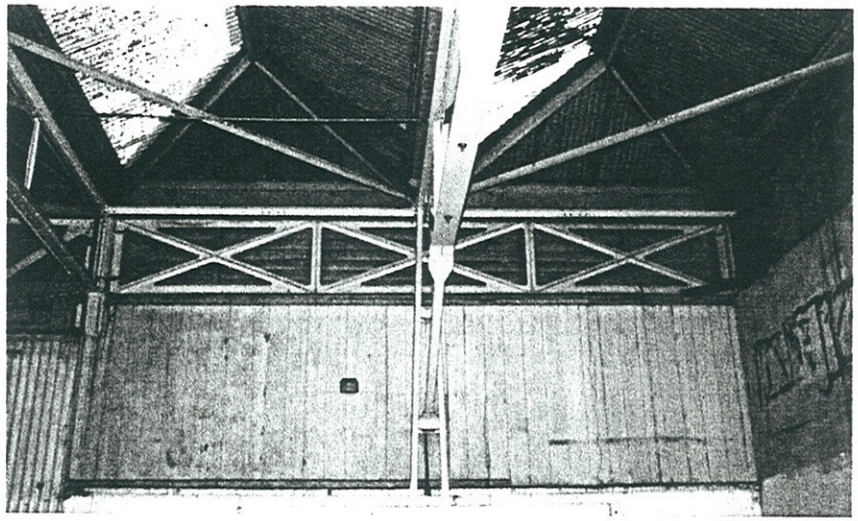


Plate 32 Primary B1 cast iron side beam with wooden louvre panels (V1 & V2) behind. Original train-shed side screen panel (W5) beneath.

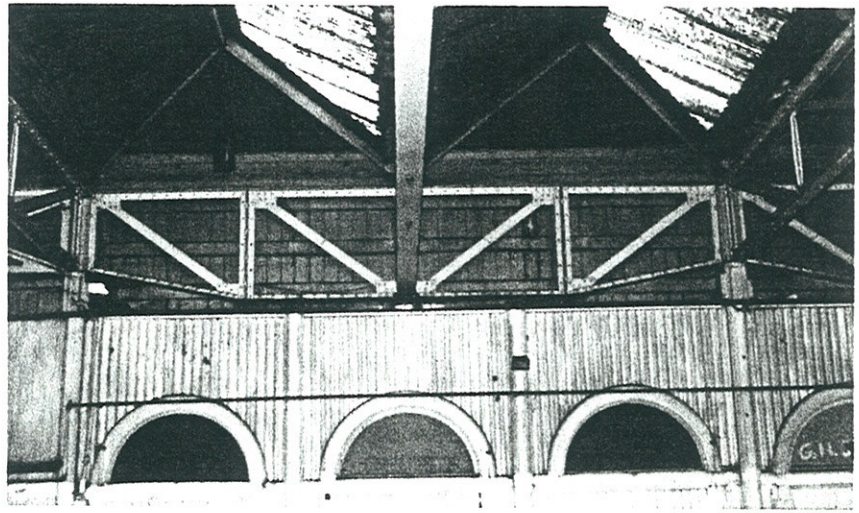


Plate 33 Secondary B2 wrought iron side beam supporting deep secondary type T3 truss. Contemporary infill panels behind. Note the former gutter flanges on the C2a & C2b type columns and how the deeper design of side beam would have precluded the continued use of a valley between these flanges.

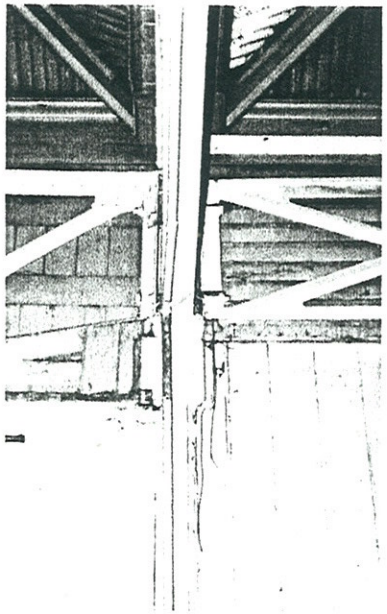


Plate 34 C2a type column with gutter flange and later rainwater hopper to left.

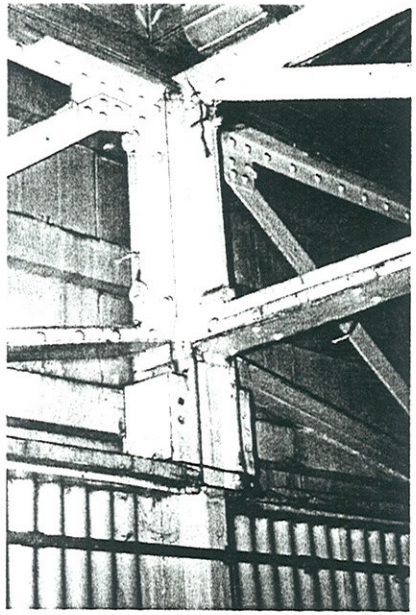


Plate 35 C2b type column with blocked gutter flanges both sides.

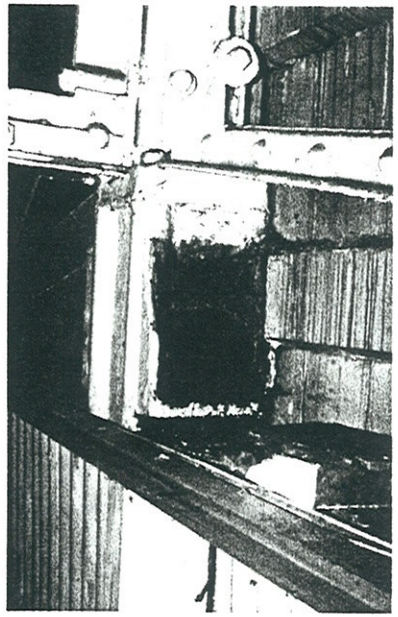
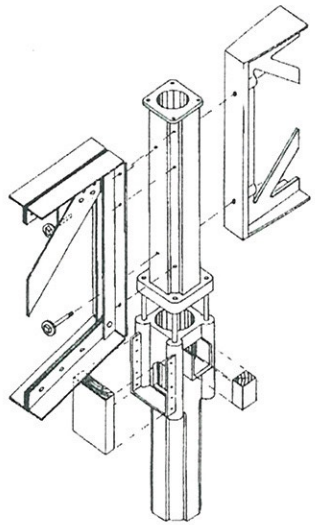


Plate 36 C2b type column with wooden blocking removed showing rainwater inlet to column.

Plate 37 Exterior of a C2a type column after peeling back the leadwork of the existing valley. The flange and blocked opening for a former transverse gutter will be noted.



Axonometric projection of a C2a type column head. (Compare with Fig CP3).

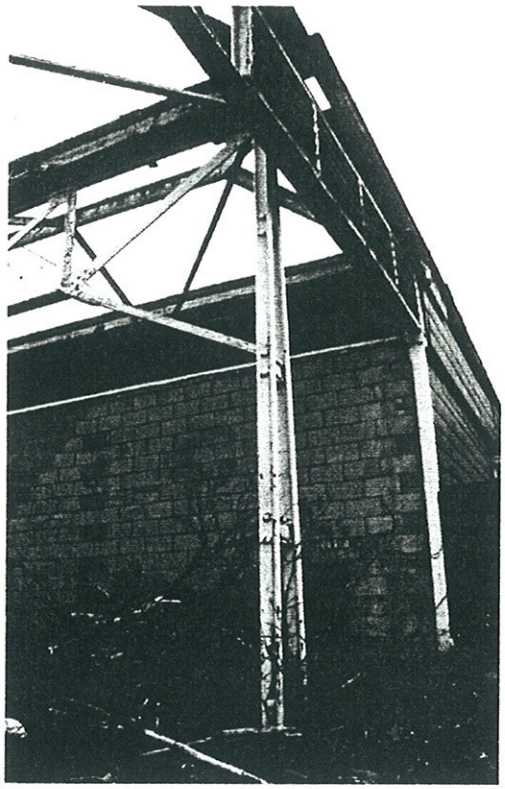


Plate 38 Rail-built C5 type column supporting inserted T2 type truss.

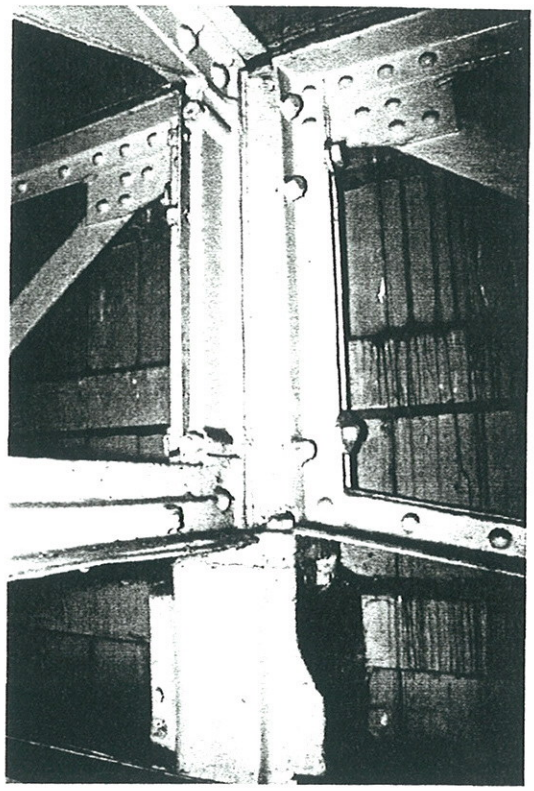


Plate 39 Typical extension column showing trusses partially supported by the bottom flange. The truss in the left-foreground is of the original T1 type whereas those to either side are secondary B2 side beams. Note the bolted connections fixing the cast iron end standard of the primary truss to the column, avoiding the wedged Paxton patent fixing (Figs CP2 & CP3). The positions of the two large bolts fixing the inserted side beams exactly coincide with the positions of the bolts which secure the earlier type B1 side beams, appearing to confirm that these beams replaced side beams of that type.

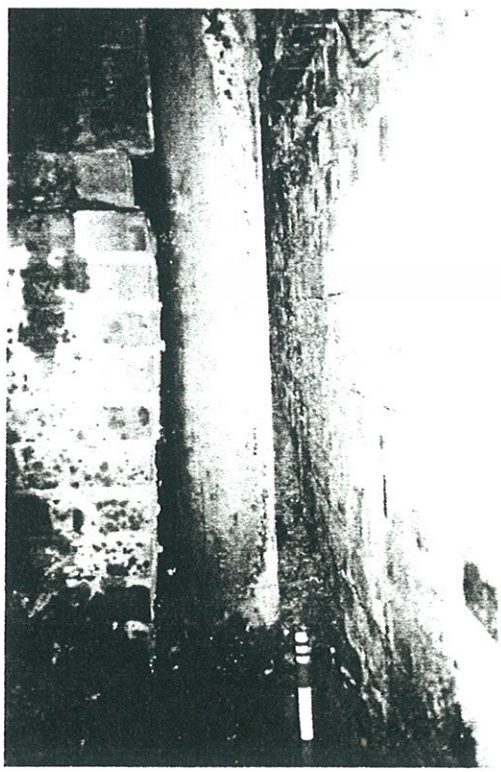
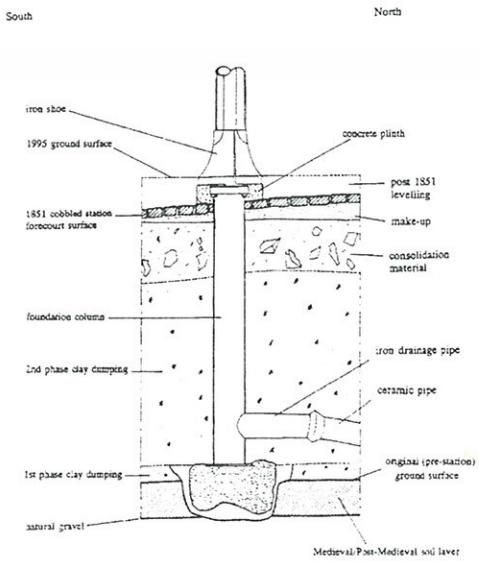


Plate 40 Foundation column found exposed at the concourse side of the void beneath the floor of the west waiting room.



Interpretive reconstructed sectional elevation of Foundation column at the south-west corner of the former porte-cochère (compare with FigCP3)

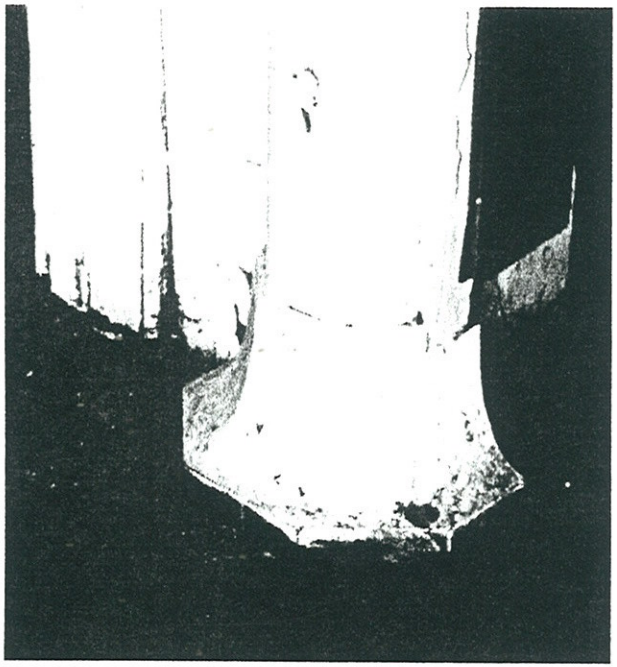


Plate 41 Six-sided interior column base as used in the arcaded sides of the concourse (compare with Fig CP4).

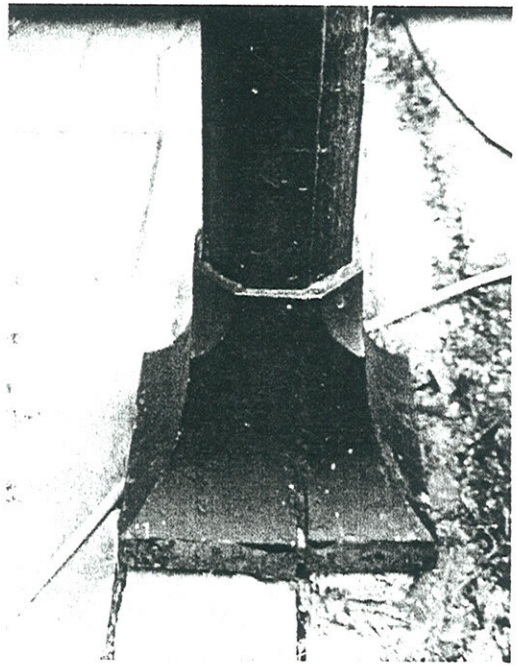


Plate 42 Two-part square column base as used on the exterior of the station and porte-cochère.

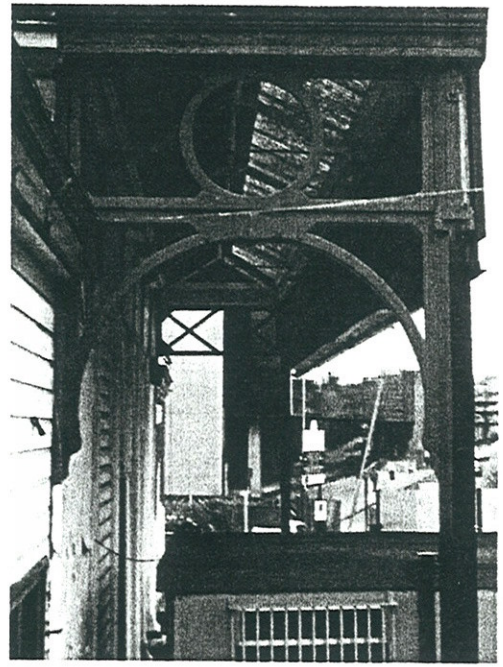


Plate 43 Decorative A1 (spandrel) and P1 (circle) decorative panels as used on the south elevation and porte-cochère. Note the join between the spandrels to the right of the central 'voussoir' cover moulding integrally-cast with the left-hand spandrel. (Compare with Fig CP4).

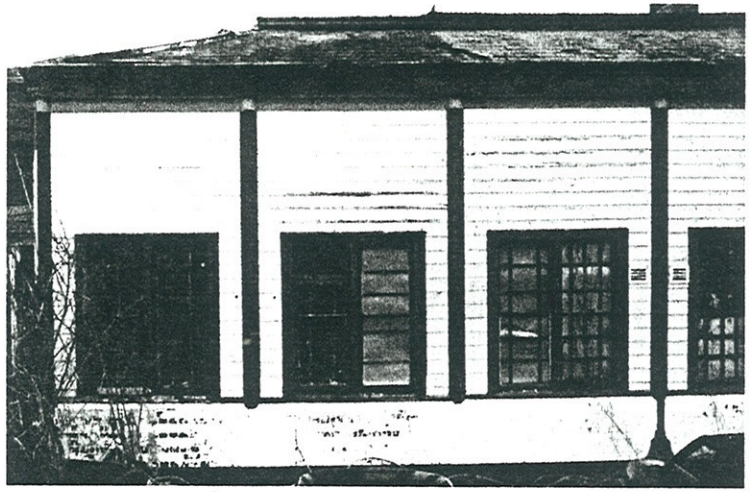


Plate 44 Typical W1 type wall panel as used on the flanking wings. Both the panels and columns originally continued to just above ground level.

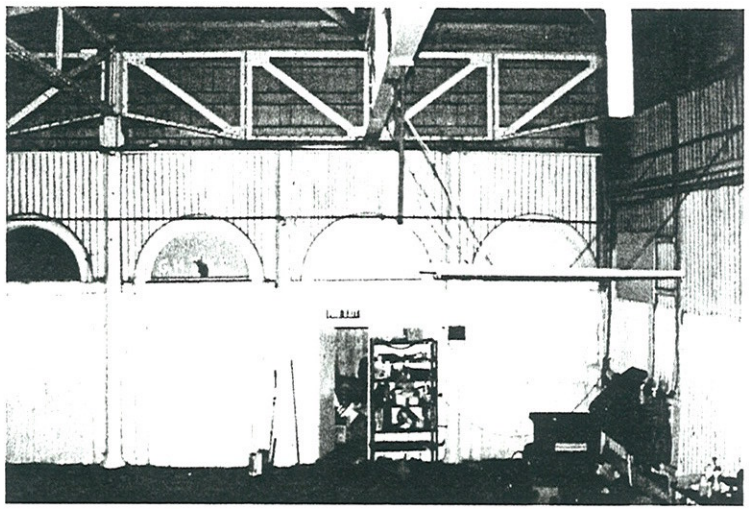


Plate 47 Corrugated iron face of a typical W2 type panel. W3 type panel of south wall of concourse to right.

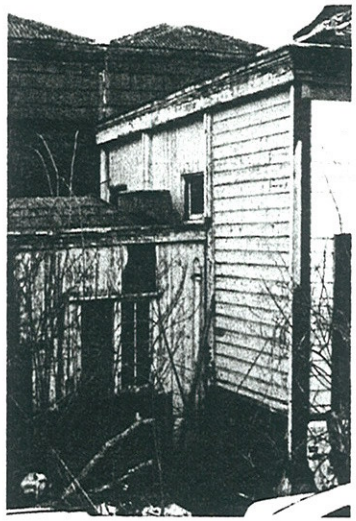


Plate 45 View of the north end of the western flanking wing showing atypical panels above the low side wing. This detail is identical to that on the corresponding part of the eastern wing. The low wings abut and postdate the vertical boarding. It is possible that the two panels shown may reflect an earlier style of wall panel. (Compare with Fig CP5).

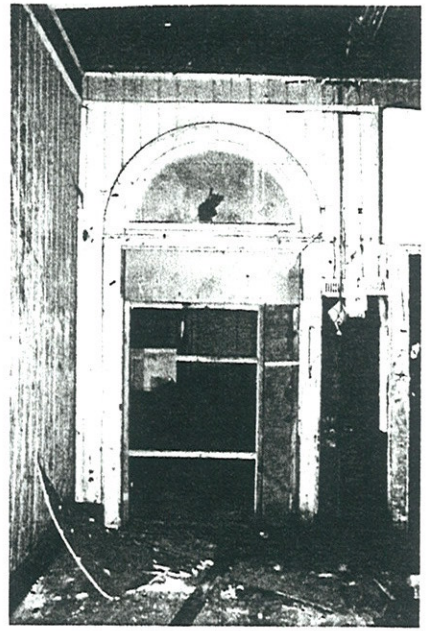


Plate 46 Typical round-headed doorway of a W2 type panel. The reeded tongue-and-groove boarding is typical of the earlier phases of interior wall cladding.

Plate 48 Exterior of W3 type wall panel. Originally the door to the left was two openings separated by an iron column. The door-head and surviving jambs appear primary.

Plate 49 Interior of one of the two remaining W5 primary trainshed side screens. The doors to the low side wings appear secondary. The fish-bellied horizontal rail is secured to the columns by cast iron fastenings reminiscent of those used in the Crystal Palace.

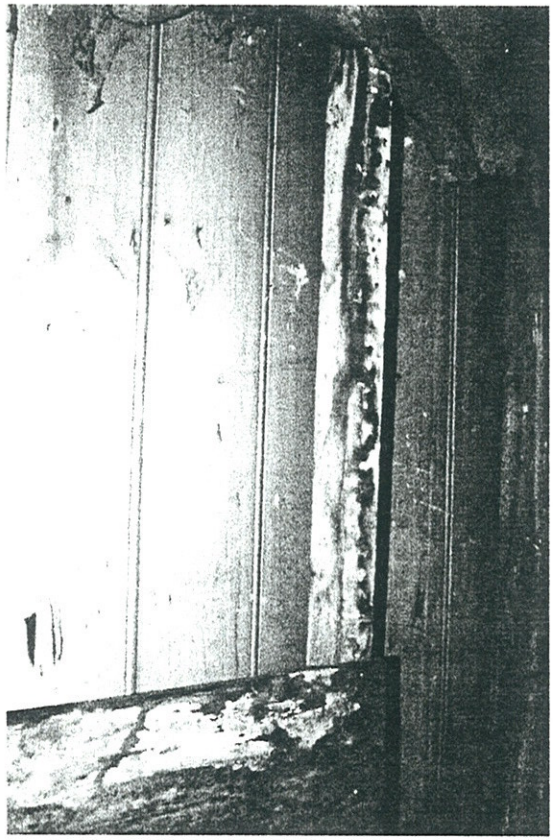


Plate 50 An area of the former external face of a W5 panel was visible where some of the wall cladding within the eastern low side wing was missing. The reeding and historic paint clearly reveals this to have been an exterior face prior to the building of the low side wing.

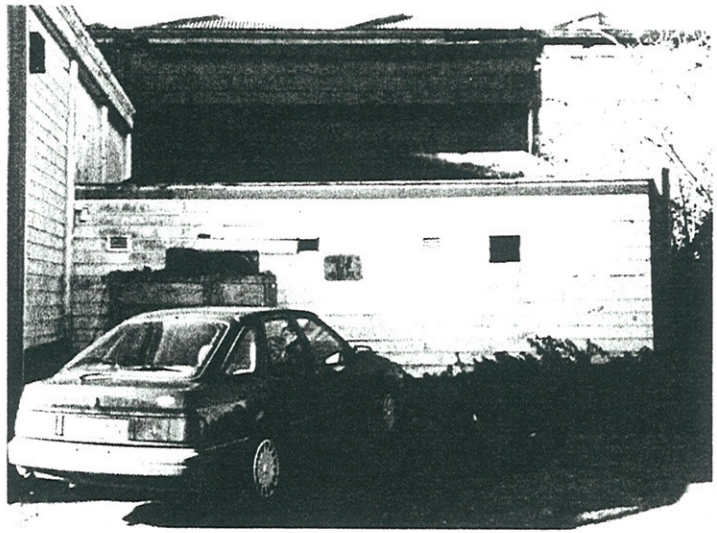


Plate 51 The exterior of the eastern low side wing showing the W4 type walling with horizontal ship-lap boarding. The remains of the round-headed window will be noted.

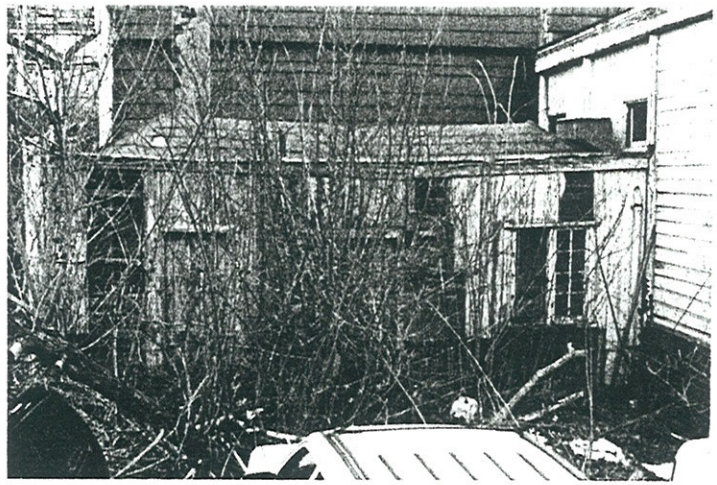


Plate 52 The exterior of the western low side wing showing the vertical boarding used.

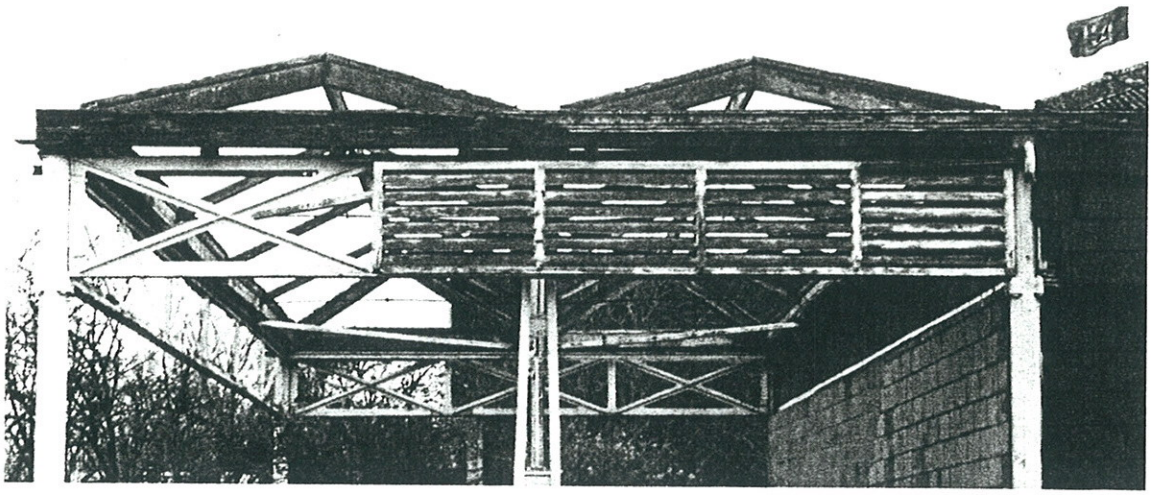


Plate 53 The V2 type wooden louvred ventilator panel surviving within the derelict portion of the trainshed.

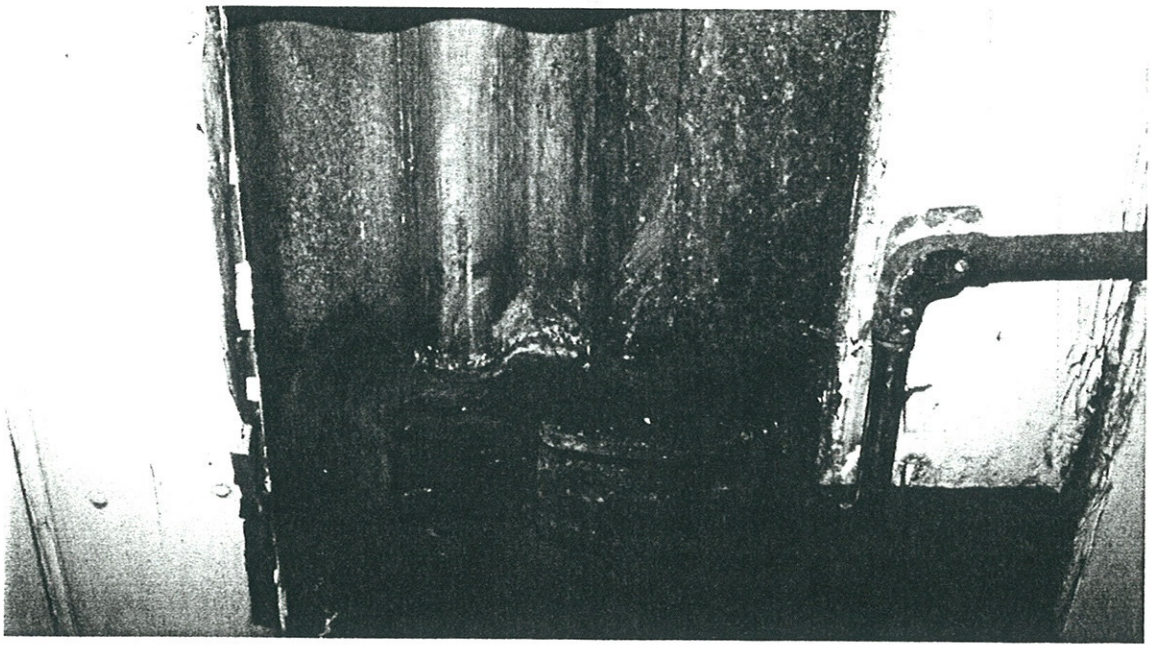


Plate 54 Typical cast iron fastening used to attach wooden wall panels to the columns in both the Oxford station and the Crystal Palace. In this instance it is used in conjunction with a W2 arcaded wall panel. Note that the original wooden rail, shaped to match the profile of the corrugated iron has been truncated and replaced with a 2" by 4" standard section, probably associated with the reeded tongue-and-groove cladding. (Compare with Fig CP5).

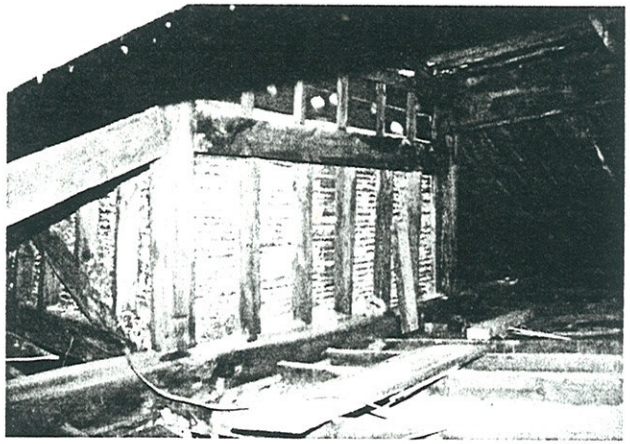


Plate 55 Standard softwood roof truss and lath and plaster light well as used within the flanking wings.

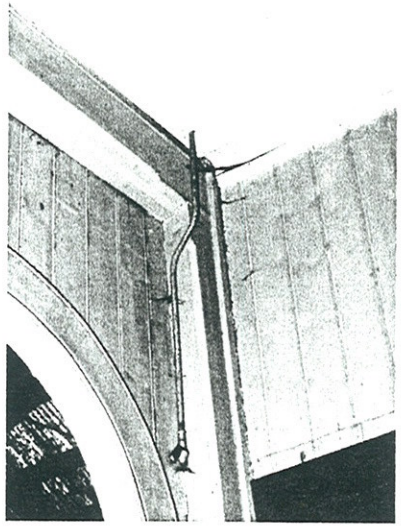


Plate 56 Within the western flanking wing the eastern (concourse) end of the timber trusses are supported by a substantial stop-chamfered softwood framework.

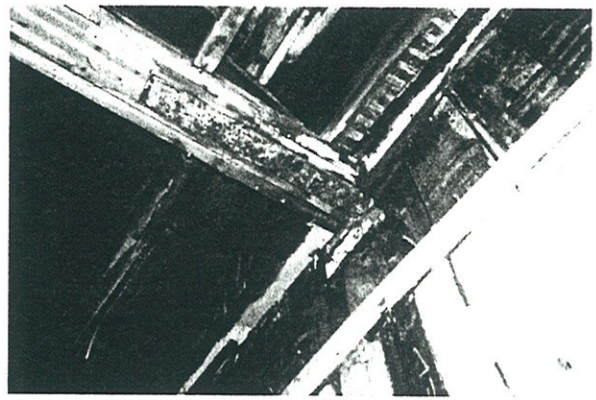


Plate 57 Within the eastern wing the concourse end of the timber trusses are supported by wrought iron angle brackets bolted to the backs of the timber and iron columns

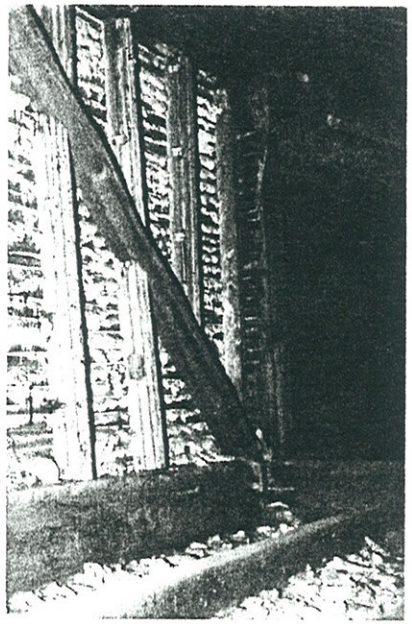


Plate 58 Former 'Paxton-esque' roof glazing bars incorporated into the former light well over the southern rooms in the eastern flanking wing.

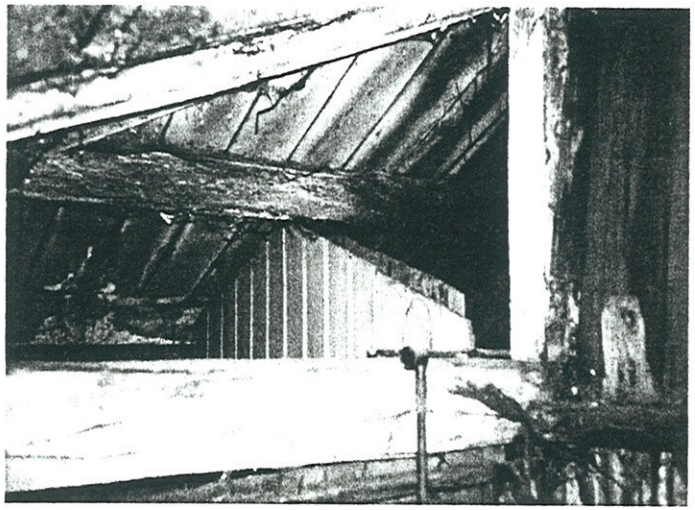


Plate 59 The former roofline of the Paxton-style ridge-and-furrow roofing over the flanking wings preserved by a reeded tongue-and-groove partition protruding into the roof-space at the north end of the western flanking wing.

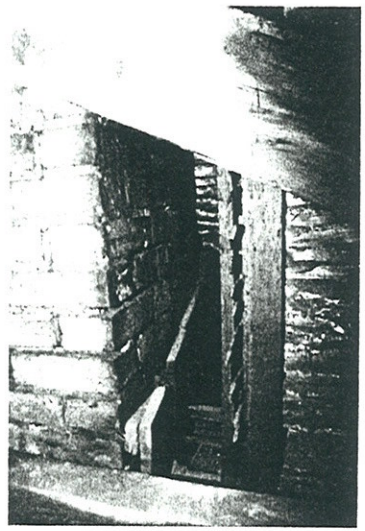


Plate 60 The former line of the roof is also revealed within the roof void by the reeded tongue-and-groove cladding of the chimney-breast of the western waiting room.

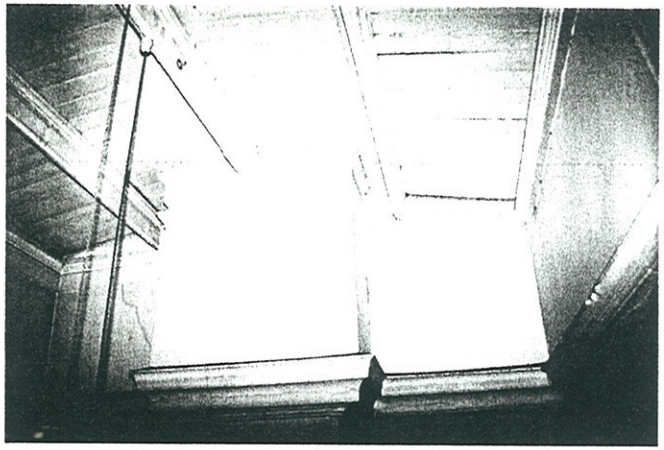


Plate 61 The elaborate cornicing and ceiling in the western waiting room. The wall on the right originally extended down to floor level. The roof and plasterwork are all secondary but the original tongue-and-groove cladding around the chimney breast is preserved behind (see previous plate).

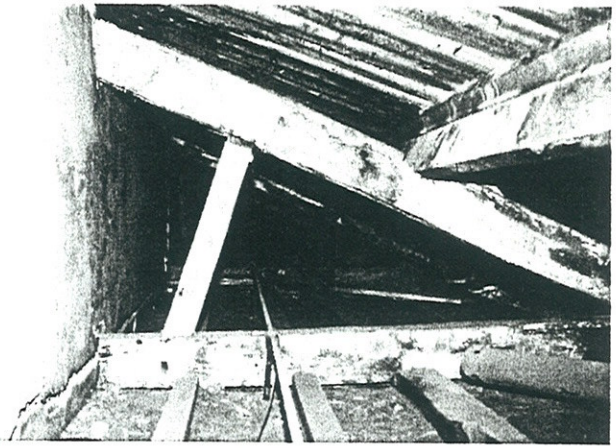


Plate 62 The reverse of the wall shown on the right of the previous plate is lathed and plastered above the ceiling line, a vestige of the days when it extended to floor level. The truss, purlin and roofboards are all limewashed.

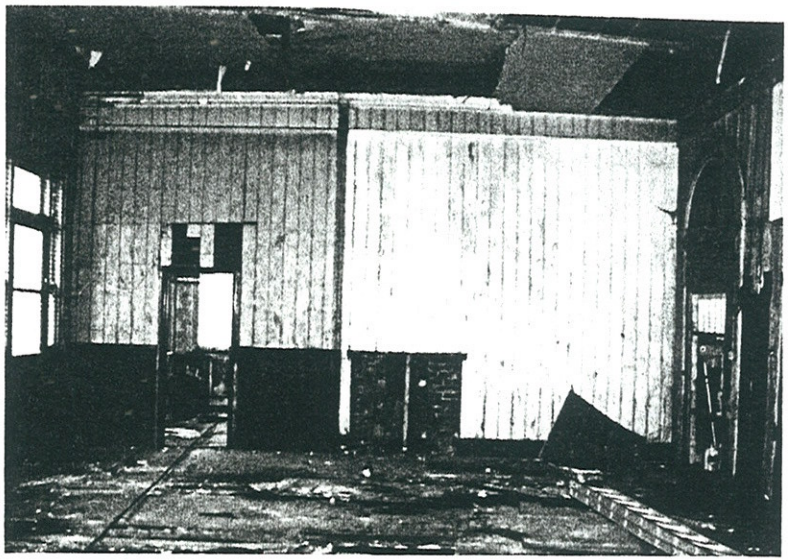


Plate 63 The interior of the original booking office in the eastern flanking wing showing site of fireplace, former partition and re-worked area around door.

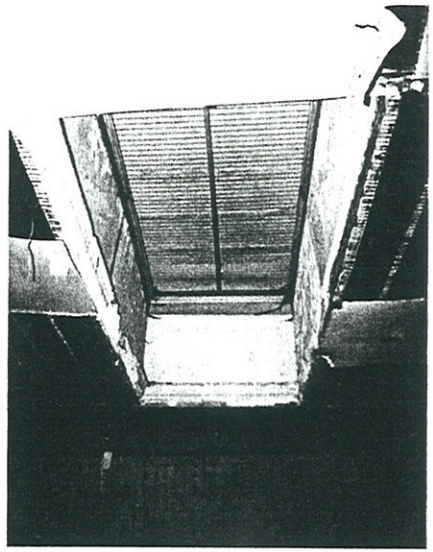


Plate 64 The remains of the light well in the original booking office showing remains of cornicing and site of later partition.

Plate 65 Shadow of former cornice in the original booking office.

Appendix A: History of the Oxford LMS Station

A1 THE BUCKINGHAMSHIRE RAILWAY

A1.1 The Great Western Railway reached Oxford from Didcot in 1844, with a terminus for the broad-gauge line in south Oxford. The arrival of the railway was not without opposition, which included the building of a paper house on its route to delay opening, and the ludicrous insistence of the University (backed by statute) on being able to enter and search the station for junior members of the University attempting to travel by train.[1] Work on an extension to Rugby and Birmingham was begun soon after, though this also proved contentious as the decade-long battle of the gauges got underway between the GWR and its rivals, but the mixed-gauge line was completed by October 1852 by when a new station on Park End Street had replaced the old GWR terminus in Western Road, Grandpont.[2]

A1.2 By 1852, however, there was already a rival route to Birmingham in the form of the Buckinghamshire Railway, promoted by the London and North Western Railway, and linking Oxford to the Euston - Birmingham line at Bletchley.[3] The Buckingham Railway Company Act of 1847 authorised a line from Bletchley to Verney with branches to Oxford and Banbury; both opened within weeks of each other in May 1851. There were various proposals for the final approach to Oxford in connection with other schemes, but in the end the Buckinghamshire Railway had little option but to run into Oxford on the east side of the GWR's designated route, though this meant turning awkwardly over the link between the Oxford Canal and the Thames (Sheepwash Channel), and locating the terminus somewhere near the site of Rewley Abbey (by then a moated farmhouse) in low-lying fields of North Oseney fronting on Park End Street.[4] The site was agreed by the Board in July 1850, but the final route was only authorised by an emending act in 1850.[5] The line had reached Islip in October 1850, and 'Oxford Road' (i.e. Banbury Road, Oxford) was opened in early December,[6] and yet it was only at this late stage that preparations were made for building the terminus at Oxford.

A2 THE STATION IS PLANNED

A2.1 The Board of the Buckinghamshire Railway considered the plans for the station on 7 November 1850, it having been agreed in July that Dockray would produce plans

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1 E.T.MacDermot, *History of the Great Western Railway* (1964), 86-8; L.L. Shadwell, *Enactments in Parliament* (O.H.S. lx, 1912) iii, 111-14.

2 Ibid., 167-8.

3 Simpson, *Oxford to Cambridge Railway* (1981).

4 Plan in O.R.O. (see A9 below); see Christ Church MS Estates 77, §421, 425 & 429 for surveys and valuations of the land.

5 Board Minute §431, 443 (see A8 below).

6 *J[ackson's] O[xford] J[ournal]*, 7 Dec 1850.

in consultation with Captain Huish of the LNWR. The plans were brought to the November meeting, and £7000 was allotted for the building, it being resolved that *'the Building be made and placed so as to be capable of Extension without any demolitions'*. Contract plans were to be prepared for a special meeting, and the position of the Goods and Passenger stations were to be reversed to place the latter nearer to town.[7] The same day that *Jackson's Oxford Journal* carried an advertisement for the opening of the Banbury Road Station at Oxford there was an invitation to tender for the new Oxford Terminus:

TO BUILDERS,

The Buckinghamshire Railway Company are about to erect a STATION at their OXFORD TERMINUS - Persons desirous of tendering for the erection of the same are requested to be in attendance at the Engineer's Office, Euston Station, at half-past One o'clock on Saturday the Seventh of December next, for the purpose of appointing Surveyors to take out the quantities
By order Edward Watkin, Secretary
Offices of the Company, Euston Station, November 29 1850.[8]

A2.2 This was a week before the Board actually met, on 12 December, to examine the final plans, which resulted in the following minute:

In reference to the Central Station at Oxford - Mr Dockray produced plans shewing designs of the permanent Buildings for both Stone and Wood Work. Resolved that Tenders be obtained for the Oxford Station on the plans proposed for the alternatives of Wood and Stone for the front-buildings, and also that Fox Henderson & Coy be asked to tender for the whole erection on the plan of the exhibition building, in all respects, as information for the Board'[9]

A2.3 Although curiously reminiscent of the Paxton's last-minute tender for the Crystal Palace, no further indication is given of the reason for this departure from Dockray's scheme. The tender documents issued by the Company in December 1850 included a specification for 'Offices, Passengers' Shed and Platforms, Goods Sheds, Engine House, Tank House, Weighing Machine House, Carriage Landings &c &c to Oxford Station.' One of the general conditions was that 'The whole of the works herein contracted for shall be executed precisely as shown upon the drawings and described in this Specification.' The tenders were to be submitted by 9 January 1851, and the works were to be completed by 1 May 1851. The one printed drawing in the specification shows a cast iron portico of eclectic gothic/classical design, while a tracing of the roof of the passenger shed has classical columns and spandrels pierced with a diminishing row of circles; a fairly average railway structure. Furthermore, the description of materials in the form of tender refers to Bath stone, brickwork, concrete and cast iron, in quantities that imply a completely different type of building from that actually constructed.[10]

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7 Board Minute §499.

8 *JOJ*, 7 Dec 1850, p.1.

9 Board Minute §507.

10 Recently discovered tender documents, in Oxon. Record Office.

A2.2 Why then were Fox and Henderson asked to submit a tender? They had been deeply involved in the preparation of the plans for the Crystal Palace from tender stage onwards and had a proven capability in cheap and reliable production. Moreover, Fox was no stranger to the LNWR, and had built the roof of the first Euston Station, while of course the LNWR had conveyed all the materials for the Crystal Palace from Birmingham to Euston Station: as the *Times* reported, 'The contractors speak with great warmth of the zealous assistance which they have received from the North-Western Railway Company in the rapid transmission of material'.[11] More important was the immense public interest in the progress of the Exhibition building in Hyde Park. The *Illustrated London News* followed its development every week, and the Oxford papers carried reports from the London *Times* on the progress of the building, while in February the front page of *Jackson's Oxford Journal* had included a large engraving of the interior of the building.[12] When the Great Exhibition opened in May the LNWR ran cheap excursions from Oxford to Euston for the opening day, and this was the very day given in the tender as the intended opening of the Oxford terminus.[13] There can be little doubt that the intention must have been to increase the publicity accruing to the LNWR by opening its station not only on the same day as the Crystal Palace but by also having a station built in the same manner. Events were to take a different course when the day came.

A3 MESSRS. FOX AND HENDERSON

A3.1 The engineers Charles Fox (1810-1874) and John Henderson (d.1858) were in partnership from 1841 until 1856 when the firm collapsed. Fox was a pupil of Robert Stephenson on London and Birmingham Railway (later LNWR), and designed original roof of Euston Station 1837. He then left and formed Bramah Fox in 1838, with Henderson taking on after Bramah's death in 1841. They worked in the 1840s in the Royal Dockyards, and built Birkenhead Market (1845), a cast iron lighthouse for India (1850), Paddington Station (with Brunel and Digby Wyatt 1850-4), Crystal Palace (with Paxton 1850), Oxford Station (1851), Birmingham New Street (with Couper 1852-4) and Kiev Suspension Bridge. At their liquidation in 1856 they owed £320,000 and laid off some 2,000 workers.[14]

A4 THE TENDERS

A4.1 A total of 18 tenders for the Oxford Station Works were opened at the Board meeting on 9 January 1851: against an Engineers' estimate of £8,000 the bids ranged from £6,904 up to £12,330; few or none of the builders were local firms. Fox Henderson & Coy at £6,552 were the lowest; they also offered corrugated iron instead of boarding for the sides of Passenger shed for an additional £31, and to warm the Offices with hot water at the same price. The Board came to an immediate decision:

'Resolved that the tender of Fox Henderson & Coy be accepted as follows:- The whole

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11 *Times* 6 Dec, quoted in *JOJ*, 14 Dec 1850.

12 *JOJ*, 8 Feb 1851.

13 *JOJ*, 26 April 1851.

14 Information on Fox and Henderson from Robert Thorne lecture.

works specified to be done for £6,552 including 12 months maintenance or if corrugated Iron be used £31 more. Any alterations as to strength or detail, which Mr Dockray may consider necessary to be made at his request without increased cost to the Company. The whole to be completed ready for use in 3 months from January 16th instant. Mr Henderson was called in and accepted the Contract as stated in the above. With reference to the position of the Passenger Station, Captain Huish was requested to confer with the Engineer and on the ground to set out the Station in such situation as may be most expedient'.[15]

It is curious that Henderson appears to have been at the office as the sealed tenders were opened.

A5 CONSTRUCTION

A5.1 There seems to have been some delay in obtaining the land for the Station, as in February the powers to 'conclude the purchases' were delegated, though by the end of the month no reply had been received from Christ Church in respect of 'their reversionary interest in the land required for the proposed new site of the station at Oxford'.[16] This must have been part of the Rewley Abbey site which was necessary for the Terminus, and was leased by Christ Church to a tenant who had already lost part of the ground to the GWR.[17] No reply had been received by mid-March, while by 10 April the college had 'declined to part with the property at Oxford'.[18] Possibly as a result of this some change was made and it was resolved that 'the alteration in the arrangement of the Station at Oxford, as shown on the plan produced (marked A) be approved' [the plan does not survive]. At the same meeting 'the Directors regret to hear that there is a probability of the line not being ready for traffic the 1st May, and they require that every exertion be made by the Engineers to secure its being opened on that date.'[19] But it was not to be, and on 8 May the Secretary was instructed to use 'every effort to get the line opened for traffic on the 15th May.' The station building must have been nearly complete since tenders for the Gas fittings were laid on the table.[20] Meanwhile on 1 May the LNWR (the new owners of the line) had to run the Cheap Excursion for the royal opening of the Great Exhibition from Oxford Road (7s and 4/6 return).[21]

A6 THE OPENING

A6.1 Finally, on 17 May, *Jackson's Oxford Journal* could announce:

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15 Board Minute §514.

16 Board Minutes §523 & 526, 12 & 21 Feb 1851, f.67.

17 Christ Church MS Estates 77, §§416, 419.

18 Board Minutes 13 March and 10 April 1851 (§§535 & 548), fos. 68v & 71.

19 Board Minutes §546, 10 April 1850, f.71.

20 Board Minutes §§561 & 563, 8 May 1851, f.72v.

21 *JOJ*, Sat 26 April 1851 front page.

It will be seen, by an advertisement in an adjoining column, that this line will be opened from the new station on the Botley-road on Tuesday next [20 May], and that on the following Tuesday [27 May] there will be a cheap excursion train to London. We understand that on Monday 26th the Directors intend giving a celebration of the opening, a grand entertainment at the Star Hotel, for which upwards of 300 invitations will be issued. Captain Winne, the Government Inspector, examined the line yesterday, and expressed himself perfectly satisfied at the manner in which it had been constructed.

A6.2 In fact the day chosen for the excursion was Monday 26, being the first day that entry to the Great Exhibition was reduced to one shilling a head. The LNWR service, from the new station via Bletchley and 'the Euston Square Station' took an hour and three-quarters and cost 3s 6d return (in 'new Covered Carriages'); not to be outdone, the Great Western ran its own 'express' service taking one hour and a quarter at the same cost, and advising potential travellers that '*The Paddington Station is the NEAREST to the CRYSTAL PALACE, and within a few minutes walk through Kensington Gardens*'.[22] Over 400 people took the LNWR excursion, which in the event took 2½ hours, and included a 'large number of artisans and mechanics employed in various large firms in the city' to whom free tickets had been distributed. In the opposite direction somewhat later in the day came a special train bearing 'the Directors their friends and others' who then made their way to the Star Hotel for a splendid Town and Gown occasion. 'Seldom', remarked the *Chronicle*:

has there been a meeting of a mixed character in which so much intellect, wealth, and respectability was present as on this occasion..... The presence of some twenty ladies added a charm to the entertainment which otherwise it could not have possessed.... The entertainment consisted of a splendid cold collation, which included every delicacy in the edible department that could possibly grace a table. There were joints, pies, fish, poultry, made dishes, and salads in profusion.... An abundance of first-rate champagne and other costly wines was also placed upon the tables.

A6.3 In this apolaustic haze the reservations of the University seem to have evaporated, and the Master of Pembroke acknowledged that 'the railway system had not in any way interfered with the discipline of the University; and the presence of nearly all the heads of houses at their festive board fully proved that those fears had entirely passed away.' The Revd. W.R. Freeman, Chaplain to the railway navvies, observed the 'great interest evinced [by the Company] towards the religious and moral well-being of the numerous labourers', quoting the interesting remark of Mr Brassey that 'no money made such a good return as that expended by employing Scripture readers along the line of works'.[23]

A6.4 Curiously, on an occasion for much self-congratulation and flattery, little mention is made of the building itself, and only *Jackson's Oxford Journal* passed remark on the building itself:

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22 *Oxford Chronicle*, 24 May 1851, adverts on front page.

23 All this from *Oxford Chronicle*, Sat. 31 May 1851.

'The new station, which is constructed in a similar manner to the Crystal Palace in Hyde Park, was decorated with flags, the bells of St Thomas's Church poured forth a merry peal, and the rattling of the various carriages, and the great concourse of people assembled at and around the station, created a scene of bustle and excitement which has been hitherto unknown in this locality.'[24]

A7. VICISSITUDES

A7.1 Later alterations to the building cannot easily be determined from railway records. Twenty years ago James Sutherland was shown a drawing at British Railways dated July 1888, which showed the secondary girders in the roof as new, but this cannot now be found.[25] Other alterations can only be dated by comparison of plans and dated photographs.[26]

A7.2 The GWR became involved in the running of the Rewley Road Station during the 1930s, and an act of Parliament gave them control of the swingbridge from the LNWR. After nationalisation in 1948 the London Midland Region continued to operate the Bletchley line until 1958 when the Western Region took over the Oxford end of the line from Bicester. But already, in 1951 the station had ceased to be used for passenger trains, which henceforward ran into the ex-GWR Station, until the Oxford to Cambridge service ceased in 1967.[27] The station was used for a short while as a hostel until it became a tyre depot, though the coal yard remained in use until the 1990s. In 1996 the tyre business removed, and the premises were taken on by Budget car hire.

A8-10: Sources and References

A8. BUCKINGHAMSHIRE RAILWAY MINUTES

Board of Directors Minute Book 1847-74 (PRO, Rail 86/3)

3 June 1850 Dockray to report at next meeting his recommendations for the Oxford Station [f.53 (431)].

11 July 1850 Discussion of Swing Bridge over Thames; site for station chosen and Dockray to produce plans in consultation with Huish [f.55 (443)].

7 Nov 1850 Plans for station produced; £7000 allotted for building; resolved 'that the Building be made and placed so as to be capable of Extension without any demolitions'; positions of Passenger and Goods Stations to be reversed so that Passenger Station be nearer town; plans for

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24 *JOJ*, 31 May 1851.

25 Sutherland 1975, referring to 'Drawing No. 66792 L&NWR Oxford Passenger and Goods Station: July 1888.'

26 OS 1:500 plan of 1878; c.1900 and later plans at Railtrack. Photographs reproduced in Simpson 1981 and Waters 1986, and at National Railway Museum, York.

27 Simpson 1981, 24, 132-9.

contract to be prepared and brought to special meeting [f.63 (499)].

12 Dec 1850 'In reference to the Central Station at Oxford - Mr Dockray produced plans shewing designs of the permanent Buildings for both Stone and Wood Work. Resolved that Tenders be obtained for the Oxford Station on the plans proposed for the alternatives of Wood and Stone for the front-buildings, and also that Fox Henderson & Coy be asked to tender for the whole erection on the plan of the exhibition building, in all respects, as information for the Board' [f.64 (507)].

9 Jan 1851 The tenders for the Oxford Station Works were opened; against an Engineers' estimate of £8,000 the bids ranged up to £12,330; Fox Henderson & Coy at £6,552 were the lowest - 'Notes if corrugated Iron instead of boarding for sides of Passenger shed £31 more. Would warm the Offices with hot water at the same price. 4[lb] glass would make £400 more.'
'Resolved that the tender of Fox Henderson & Coy be accepted as follows:- The whole works specified to be done for £6,552 including 12 months maintenance or if corrugated Iron be used £31 more. Any alterations as to strength or detail, which Mr Dockray may consider necessary to be made at his request without increased cost to the Company. The whole to be completed ready for use in 3 months from January 16th instant. Mr Henderson was called in and accepted the Contract as stated in the above. With reference to the position of the Passenger Station, Captain Huish was requested to confer with the Engineer and on the ground to set out the Station in such situation as may be most expedient' [f.65 (514)].

A9. UNPRINTED SOURCES

- Public Record Office, Kew: Buckinghamshire Railway Records, (Rail 86)
  Board Minutes 1847-74: 86/3
  Index to Board and Committee Minutes: 86/8

- Oxfordshire Record Office ('Oxfordshire Archives')
  Deposited Plans:
    PD2/22 (29 Nov 1845, as Simpson p.8)
    PD2/49* (20 Nov 1846, North Oxford curves)
    PD2/55 (30 Nov 1849, as Simpson p.9 and as built)
  Set of tender documents for the Oxford Terminus, with quantities and illustrations.

- Railtrack Records Section, Swindon: GWR Plans
  No detailed drawings except plans of Station yard layout, c.1900 and later (transferred from Euston). Drawing No. 66792 seen by Sutherland could not be traced in 1994. A drawing of the existing swing-bridge is dated December 1906 (fiche 16330-1).

- Christ Church Archives:
  MS Estates 77 contains west Oxford material.

A10 PRINTED MATERIAL

Acts of Parliament: *An act for making a railway from Oxford..... to the London and Birmingham railway at Bletchley*, 1846 (9 & 10 Vict c.82 L&P; cf 10 & 11 Vict c.236 L&P, and 16 & 17 Vict c.205 L&P).

An act to authorize an alteration in the line of the Buckinghamshire railways at Oxford..., 1850 (13 & 14 Vict c.6 L&P).

J. Bassin *Architectural Competitions in Nineteenth-Century England* (UMI, Ann Arbor Mich., 1984)

G.F. Chadwick *The Works of Sir Joseph Paxton 1803-1865* (Architectural Press, 1961).

R. Christiansen *A Regional History of the Railways of Great Britain Volume 13 Thames and Severn* (D&C, 1981).

C. Downes & C. Cowper *The Building erected in Hyde Park for the Great Exhibition* (Weale, 1852, repr V&A, 1971).

Y. ffrench *The Great Exhibition of 1851* (Harvill, 1950)

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March 1995 & 1996

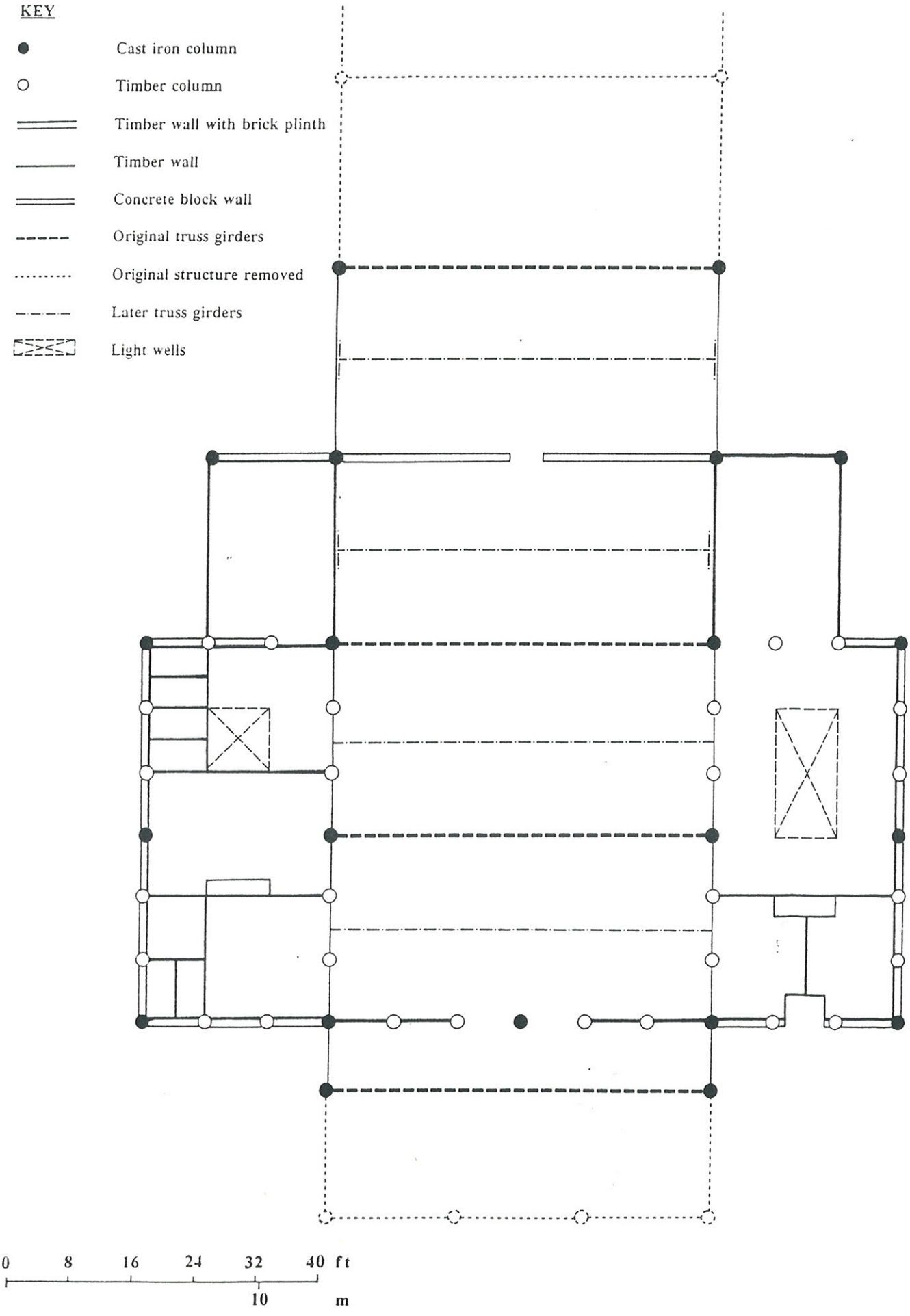


Fig. A1 Sketch plan of LMS Station modular structure

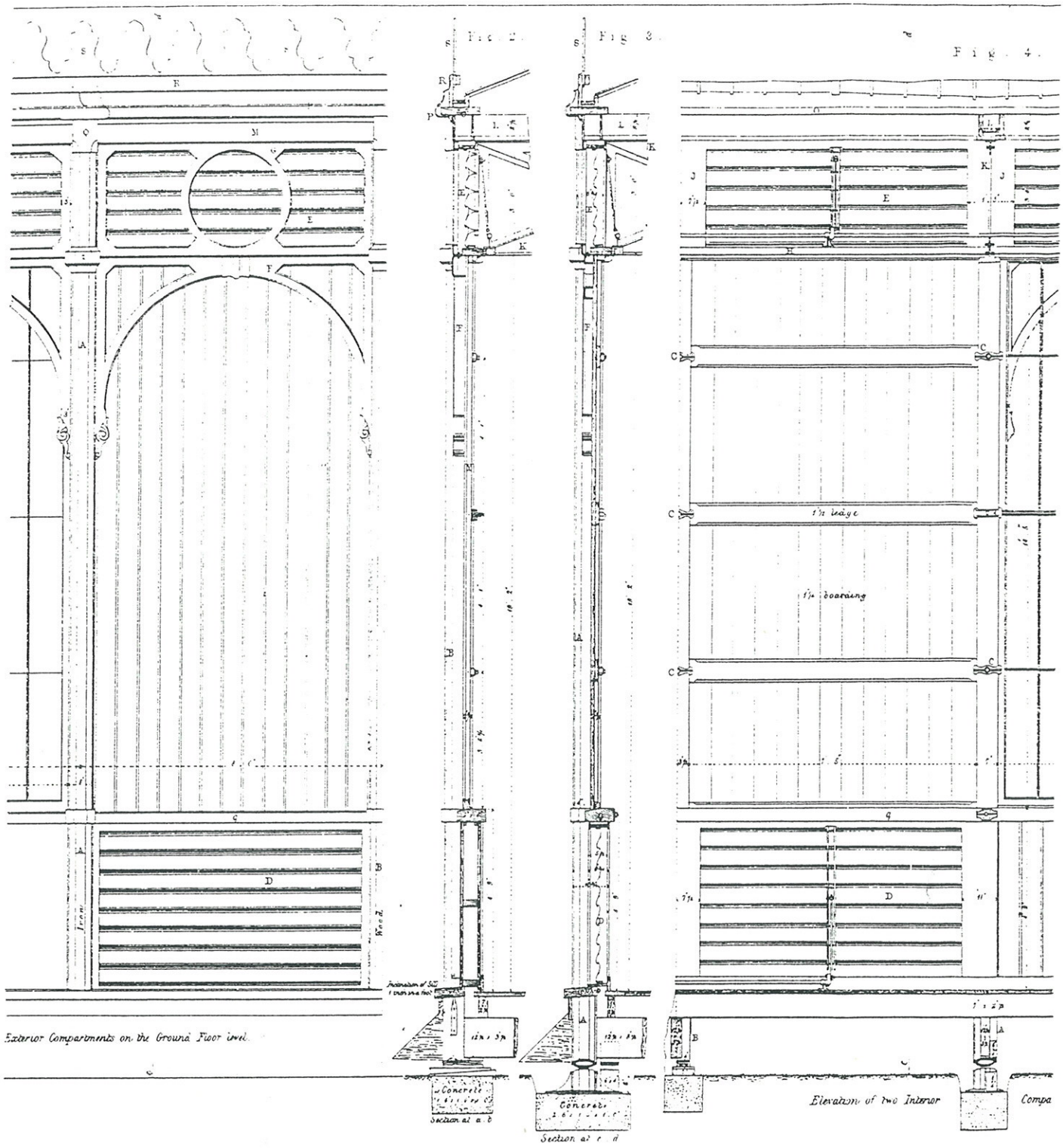


Fig. A2 Elevation of Crystal Palace bay structure

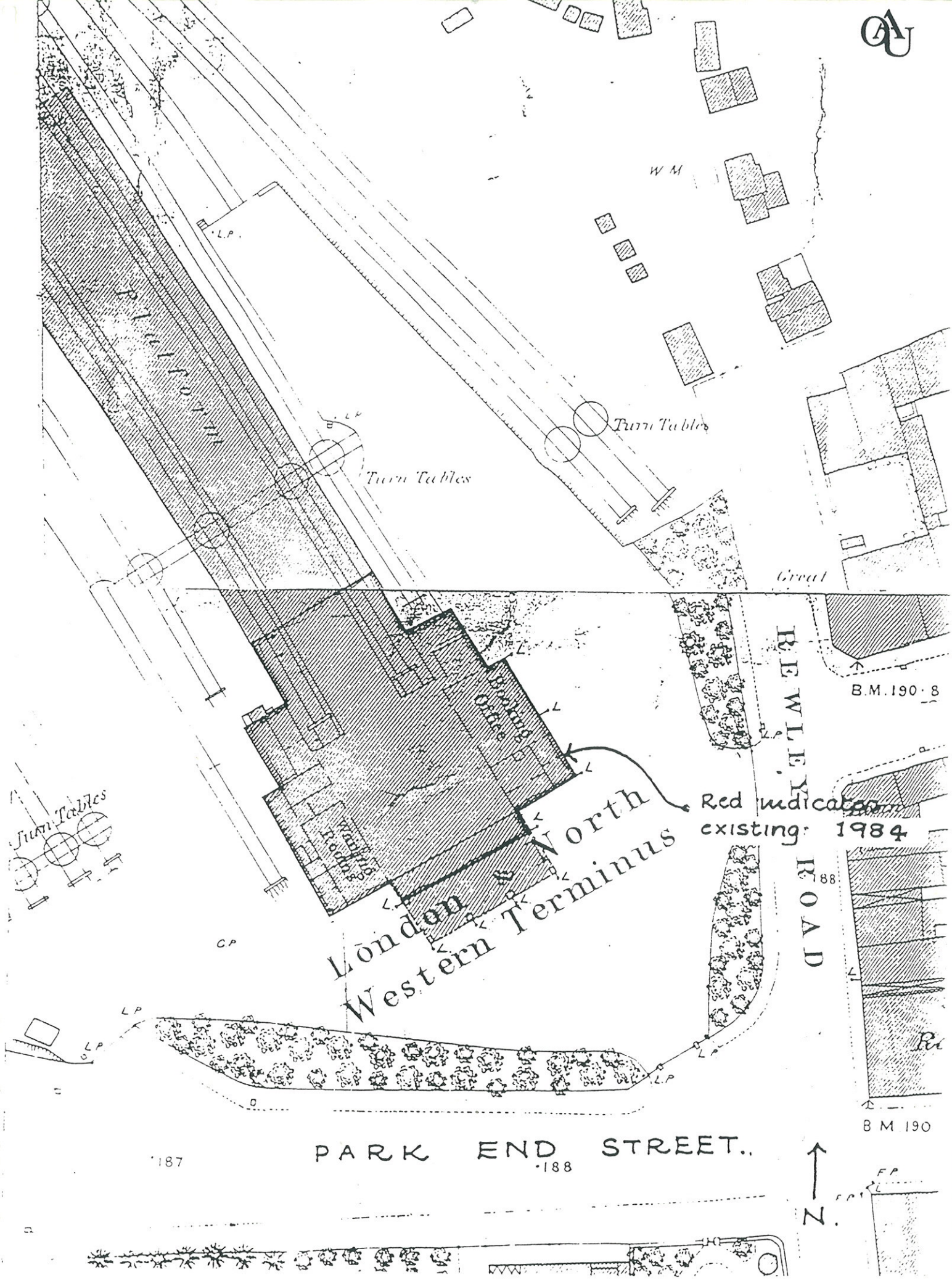


Fig. A3 Ordnance Survey 1876 1:500 Plan

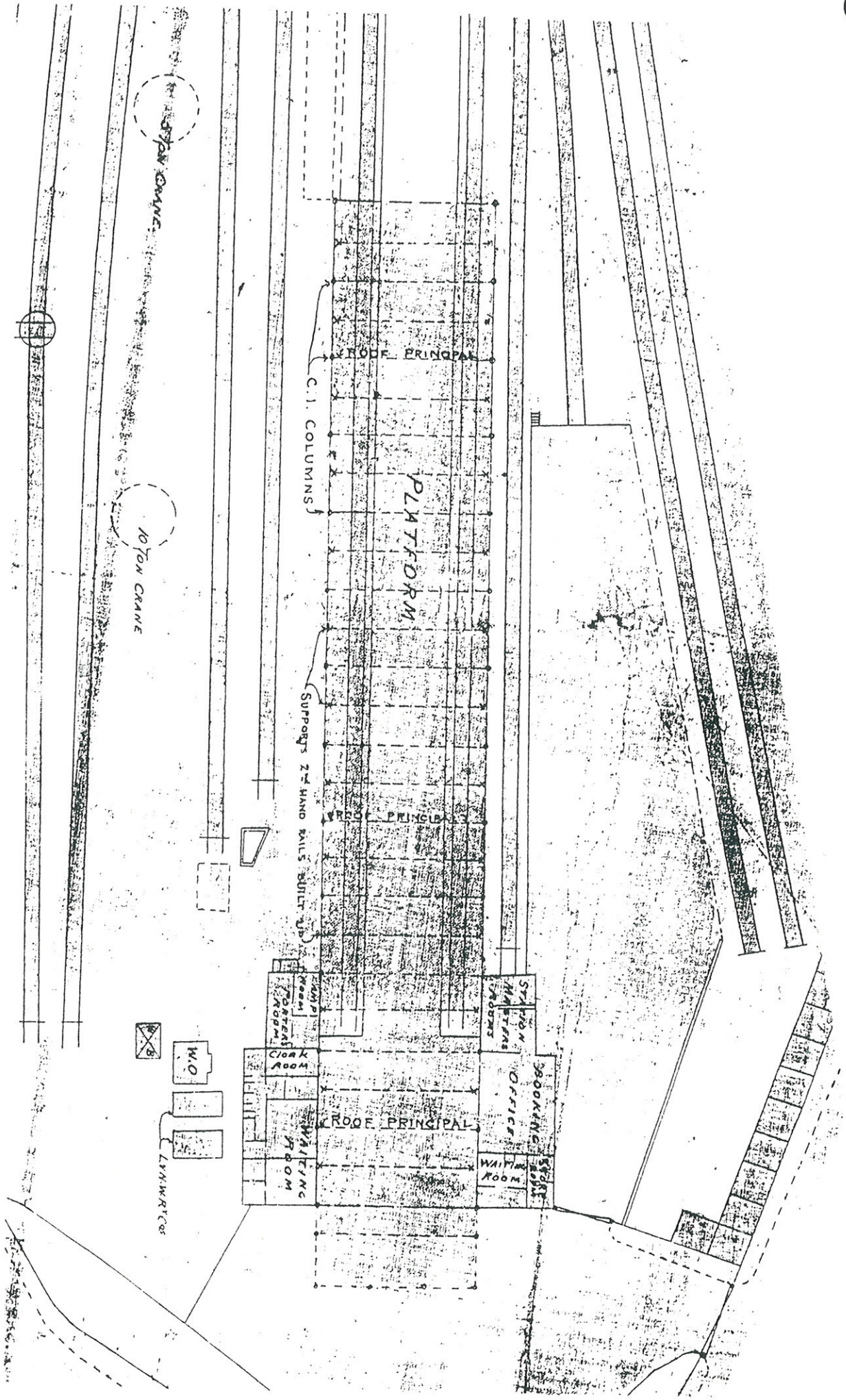


Fig. A4 Plan of station yard in c.1900 (Railtrack)

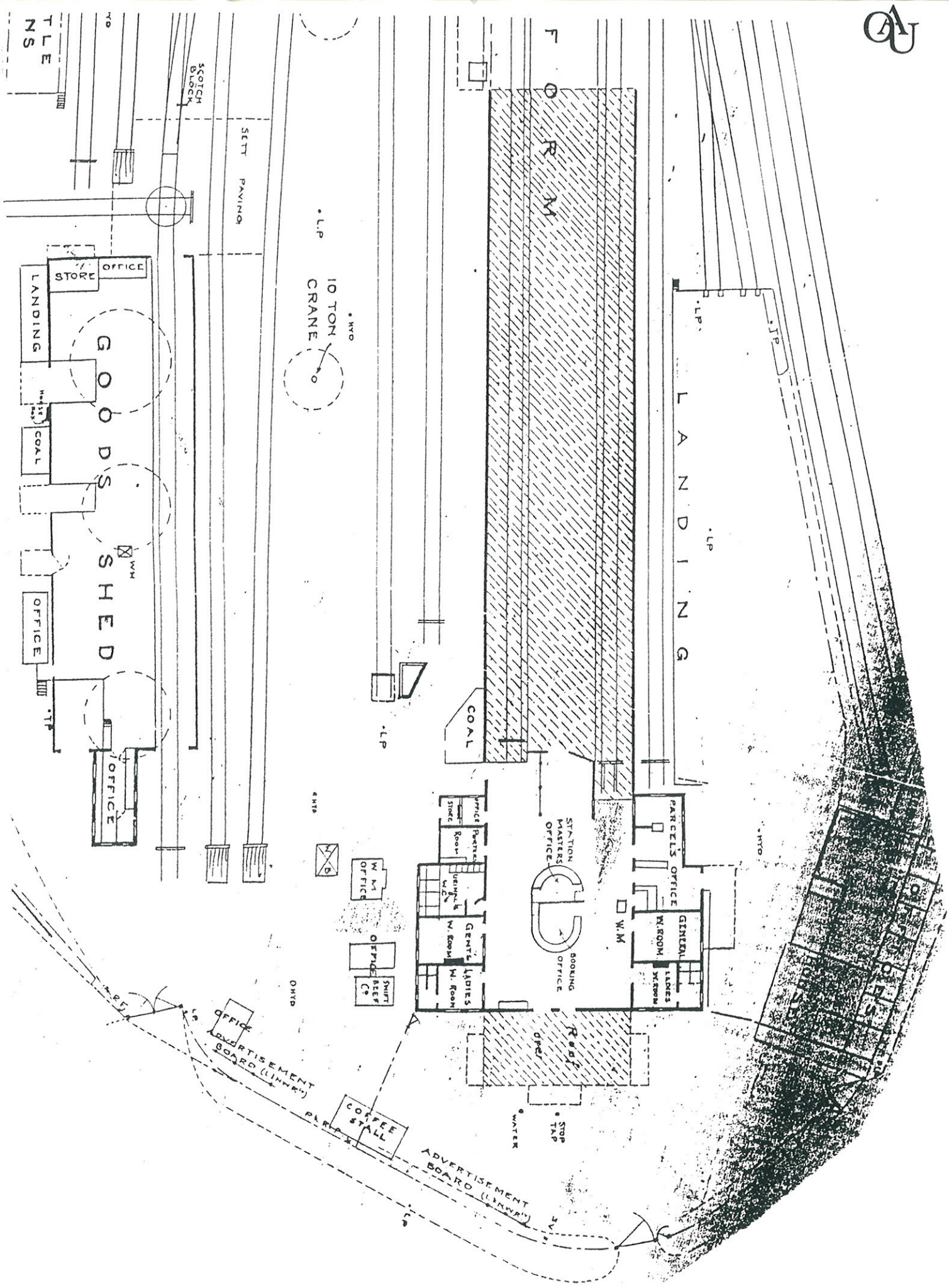


Fig. A5 Plan of station yard in early 20th cent. (Railtrack)

Appendix B: Investigation of foundation structure

The Oxford Rewley Road (L.M.S.) Station

B1. Introduction

At the request of Railtrack and Stanhope Properties, an investigation was carried out on the foundations of this 1851 Grade II* listed structure. As is well known, the former railway terminus is a pre-fabricated structure of cast-iron modules with timber infill panels. No information was available concerning the composition or arrangement of the foundations, and in order to determine whether they were the same as those shown on published drawings of the Crystal Palace, trial excavations were carried out between the 27th and 28th of March, 1995.

B2. Stratigraphy

Several trial trenches were cut, as shown on the plan at A, B, C, and D. At the depths excavated, no stratification was apparent, trench A being located in a zone of rubble and sand infill, consistent with its paved environs and excavations at B-D rapidly encountered disturbed grey and ochre coloured clays. These clays are consistent with these found during excavations on the site of the adjacent coal yard, where it was found that the natural gravel deposits had been covered with a 1-2 metre layer of clay, probably during levelling preparatory to the laying-out of the station c.1850.

B3. Columns

At each point investigated, the supporting columns were of identical composition: hollow cast-iron tubes (doubling as rainwater down-pipes) consisting of four raised fillets upon a circular column of approx. 8 inch (200mm) diameter. Each column terminates in an integral cast flange 2⅜ (60mm) thick with four bolts, hidden by a cast-iron decorative base moulding.

B4. Foundations

B4.1 *Trench A*: The column under investigation here is the one original support remaining of the porte-cochère. Prior to excavation the flange and foundation were completely hidden by a two part square base moulding with eliptic sides as shown. The lifting of a small broken concrete paving slab allowed a shallow excavation which revealed the flange, bolted (by four bolts with 1½ inch (38mm) square heads and nuts) to an identical flange on a round cast-iron foundation column of approx. 8 inch (200mm) diameter. This was followed downward to a depth of 350mm with no apparent variation.

B4.2 *Trench B*: This column is in the centre of the station itself and supports one of the primary transverse roof girders. It is located on the interface between the stone paved passenger concourse and the western wing, which has a ventilated timber floor with a cavity beneath it. Unlike the external columns, this and all the other internal columns terminates in an octagonal eliptic decorative base moulding. Fortunately, the floorboards adjacent to this column had partly rotted and the void beneath was accessible.

It is apparent that the joists of the timber floor of the west wing are supported on engineering brindle/blue Staffordshire brick piers, whilst the perimeter of the concourse is supported on a wall of these same bricks, corbelled out at the top in the manner of railway platform edging. The column is supported on neither the wall nor pier, but instead is flanged, as at A, to a cast-iron foundation column. This was followed down into the clay to a depth of 1750mm below the flange and probing another 200mm revealed no change.

B4.3 *Trench C*: This column again supports a primary roof girder, and is located in the present north wall of the Tyre Centre currently occupying the premises. It marks the original northern extent of the passenger concourse, beyond which were once located the buffer stops and platforms. The newer breeze block wall to the east (post-dating closure as a station) and the older engineering brick to the west, obscure most of this column in section. Excavation soon revealed the platform surface and a depression marking the site of the sole-plate of the platform side screens. The usual flange detail was also revealed however, with the top of the foundation column disappearing downwards into the brickwork of the platform. Further excavation only revealed more brickwork. It would appear that the brickwork to the west of the column, and that of the platform are of the same phase.

B4.4 *Trench D*: This column is one of those incorporated into the walls of the wings of the building. The timber infill panels of these wings are supported on waist-high walls of engineering brick, the decorative base cover sitting on a projecting plinth of the same brick. Excavation revealed only a narrowing of the brick plinth, however this would appear inconsistent with it being a load-bearing foundation, and it is possible that the usual foundation column is contained within.

B5. CONCLUSION

Although some unexpected discoveries have been made, it is not certain what conclusions can be drawn. However, it seems that:

(1) The visible columns are flanged and bolted to hollow columns below ground which are plain cast-iron flanged pipes of approx. 200mm in diameter.

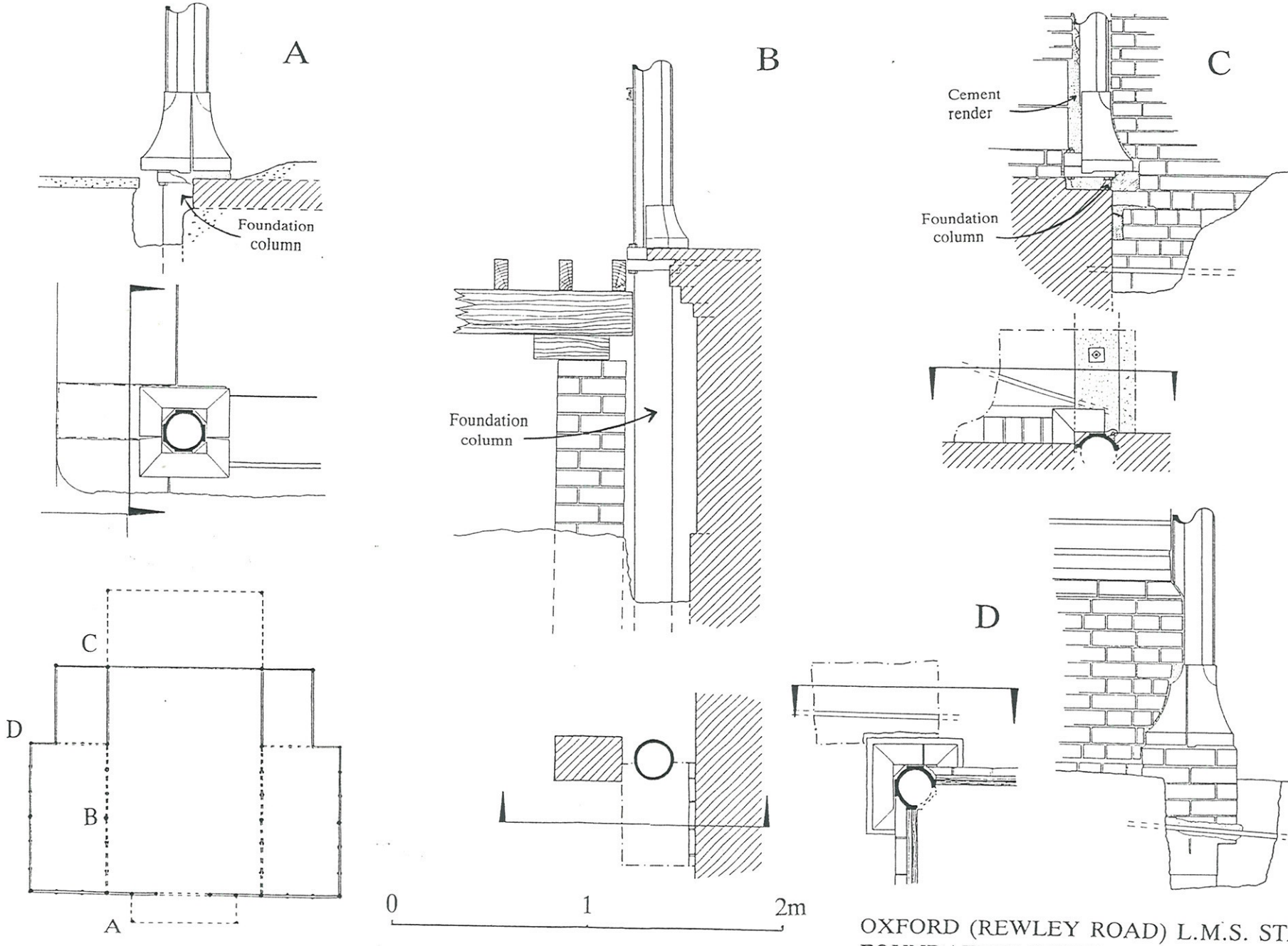
2) The foot of one of these had still not been reached 2000mm below internal floor level.

3) These foundation columns probably appear throughout the concourse area, and may be present in the wings, though this is yet to be proved.

4) These columns probably acted as rainwater downpipes and are connected to drains.

It may be speculated that (1) If, as seems likely, these columns acted as downpipes, unless each leads to its own separate soak-away, the foot of each should be at a similar depth (allowing for fall); and (2) A storm drain or sewer should be present either integrally with, or adjacent to, a foundation for the columns, at some depth >2metres below the floor. It seems likely that there are substantial remains well below ground level, and further work may be needed to understand this aspect of the historic building.

Rob Kinchin-Smith
Oxford Archaeological Unit
March 1995



OXFORD (REWLEY ROAD) L.M.S. STATION
FOUNDATION DETAILS

Fig. B1

Appendix C: Investigation of foundation of porte cochère
The Oxford Rewley Road (L.M.S) Station

C1. INTRODUCTION

At the request of Railtrack and Stanhope Properties a further stage of evaluation was carried out by OAU in June 1995, in order to determine the details of the depth and character of the foundation columns that had been identified in March. A single trench was dug in the forecourt of the station to locate the outer column base of the former porte cochère (in the south-west corner). The canopy originally consisted of two bays, with cast iron columns supporting the roof; the south bay was removed in c.1960 and if, as was suspected, the columns were removed at or near to the present ground level, then the foundations were likely to remain in situ. The object of the OAU's investigation was to establish the exact location of one of the column foundations, and to analyze the construction technique and depth of foundation.

C2. METHODOLOGY

With the aid of plans of the station site, the possible location of the south-west corner column was identified (Fig. 1). A trench was dug using a JCB around the suspected location of the foundation. The excavated trench was 3.20 m long, 1.80 m wide, and was dug to a depth of 2.60 m below the present surface level. The present surface slopes gently from north to south: the top of the north end of the trench lies at 58.30 m OD and the top of the south end of the trench at 58.25 m OD. The depth of the trench necessitated the use of shoring. The top of the truncated iron column was exposed almost immediately, 0.20 m below the surface of the tarmac (at 58.13 m OD), and the trench was carefully excavated to expose the column in section. Thereafter the trench section was cleaned by hand.

C3. RESULTS

The earliest deposit in the trench was a layer of grey-white gravel [1012] which was interpreted as natural, and lies at 55.76 m OD (Fig. 2). This layer was sealed by a layer of dark-brown humic loam [1011], which is probably a medieval or post-medieval soil horizon. A layer of light blue-grey clay [1008] overlay 1011, at which level a cut feature was observed in the trench section.

Cut 1014 was filled with a large concrete block [1009] upon which the flat circular base of the column [1006] was laid. The base of the concrete block rests at 55.73 m OD. The column itself was hollow, to allow for water drainage, with an integral outflow pipe connected to a ceramic drainpipe [1007]. The ceramic pipe had a diameter of 0.18 m, increasing to 0.24 m where it joined the metal pipe. The ceramic drainpipe curved slightly to the east, but was truncated during the machining. The iron column measured 205 mm in diameter, and was 5/8" thick. The surviving height of the column was 1.98 m.

A thick layer of mixed blue-grey clay [1005] butted the column, and sealed the concrete base block. This layer represents levelling prior to the station being completed (as identified elsewhere on the Rewley Abbey site), and must therefore have been deposited during the construction of the station.

Layer 1005 was sealed by a layers of limestone blocks and sandy gravel [1004, under 1003], prior to the laying of a layer of granite cobble sets, 1002. The cobble sets sloped gently from north to south, the surface level at the north end of the trench being 58.18 m OD. A thin skim of tarmac [1001] covered 1002. Layers thereafter relate to the present car park surface.

C4. Conclusions

The excavation successfully located and exposed the relevant iron column and confirmed that the canopy had been removed to ground level only. It may be assumed that the other three columns remain below the present ground level. Of note is the fact that in the construction area of the station some clay levelling had occurred prior to the erection of the canopy, with a secondary phase of clay dumped against the column 'in situ'. It would appear that no other support for the foundation column was felt to be necessary.

The hollow column fed a ceramic drain pipe which must have led to a main sewer. The ceramic drain was seen in section to be curving to the east, so it is possible that the sewer lies to the centre of the present forecourt area, if not to the east of the building following the line shown on the plan (Fig. 1).

The layer of cobble sets is likely to have been the surface in use early in the 1850s, itself replaced by tarmac, in this century. The rest of the deposits observed towards the top of the evaluation trench are of recent origin. No finds, pottery or otherwise, were recovered during this investigation.

C5. Significance of discoveries

The appearance of the column can be reconstructed from survey of the level of the adjacent column and photographs taken before demolition (Fig. 3). The depth of the foundation column (approx. 2.14 m or 7 foot) is just slightly more than was revealed inside the building in the course of the previous investigation. The section with its indications of substantial clay dumping comes close to confirming the statement that the rail level in the station was nine foot above the contemporary ground surface (Simpson *Oxford to Cambridge Railway* 1981, 11). The column itself (Fig. 3) is of interest for being different from those in the Crystal Palace (Fig. 4a), in the column being circular rather than filleted, and having a circular rather than rectangular base flange. The provision of an integral drainage facility is however a marked point of similarity between the two, as is the shallow concrete foundation (Fig. 4a-b).

It is probable that all the principal columns of the surviving LMS building (i.e. those on 24-foot centres) are of this sort, though it cannot be certain how deep they are. In the Crystal Palace as built in Hyde Park there was some variation in the depth of the foundation columns to make up for falling ground (Fig. 4b), though this was less likely to be necessary on a low-lying alluvial site like Rewley mead. The discovery of the drainage facility suggests that all the columns were used as downpipes, and indeed they may still be connected to the mains sewer crossing the site.

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Oxford Archaeological Unit
June 1995

TABLE OF CONTEXT INFORMATION

CTXT	TYPE	DEPTH	WIDTH	COMMENTS
1000	Layer	0.22 m	-	Concrete make up for car park surface
1001	Layer	0.04 m	-	Tarmac surface over cobble set layer 1002
1002	Layer	0.12 m	-	Layer of granite cobble sets, 1850's station surface
1003	Layer	0.12 m	-	Gravel and sand make up for cobbles 1002
1004	Layer	0.39 m	-	Sand and limestone blocks over clay 1005
1005	Layer	1.48 m	-	2nd phase clay levelling layer, over 1st phase. Seals foundation material 1009
1006	Structure	1.98 m	20.5 cm	Hollow cast iron column, original footing for dismantled canopy
1007	Service	-	0.18 m	Ceramic drain pipe connected to iron column, ?leads to sewer main
1008	Layer	0.11 m	-	1st phase clay levelling, level from which foundation column was constructed
1009	Layer	0.50 m	0.70 m+	Concrete block supporting iron column 1006
1010	Fill	0.16 m	-	Base fill of construction cut 1014, gravel and concrete mixture
1011	Layer	0.26 m	-	Med/post-medieval soil horizon
1012	Layer	-	-	Natural gravel
1013	Service	-	-	Metal service pipe aligned NW-SE, function unclear
1014	Cut	0.46 m	0.70 m+	Construction cut for foundation column 1006, cut from level of clay layer 1008
1015	Structure	0.15 m	-	Concrete flag foundation to W of the car park
1016	Layer	0.12 m	-	Present tarmac surface, butts concrete 1015

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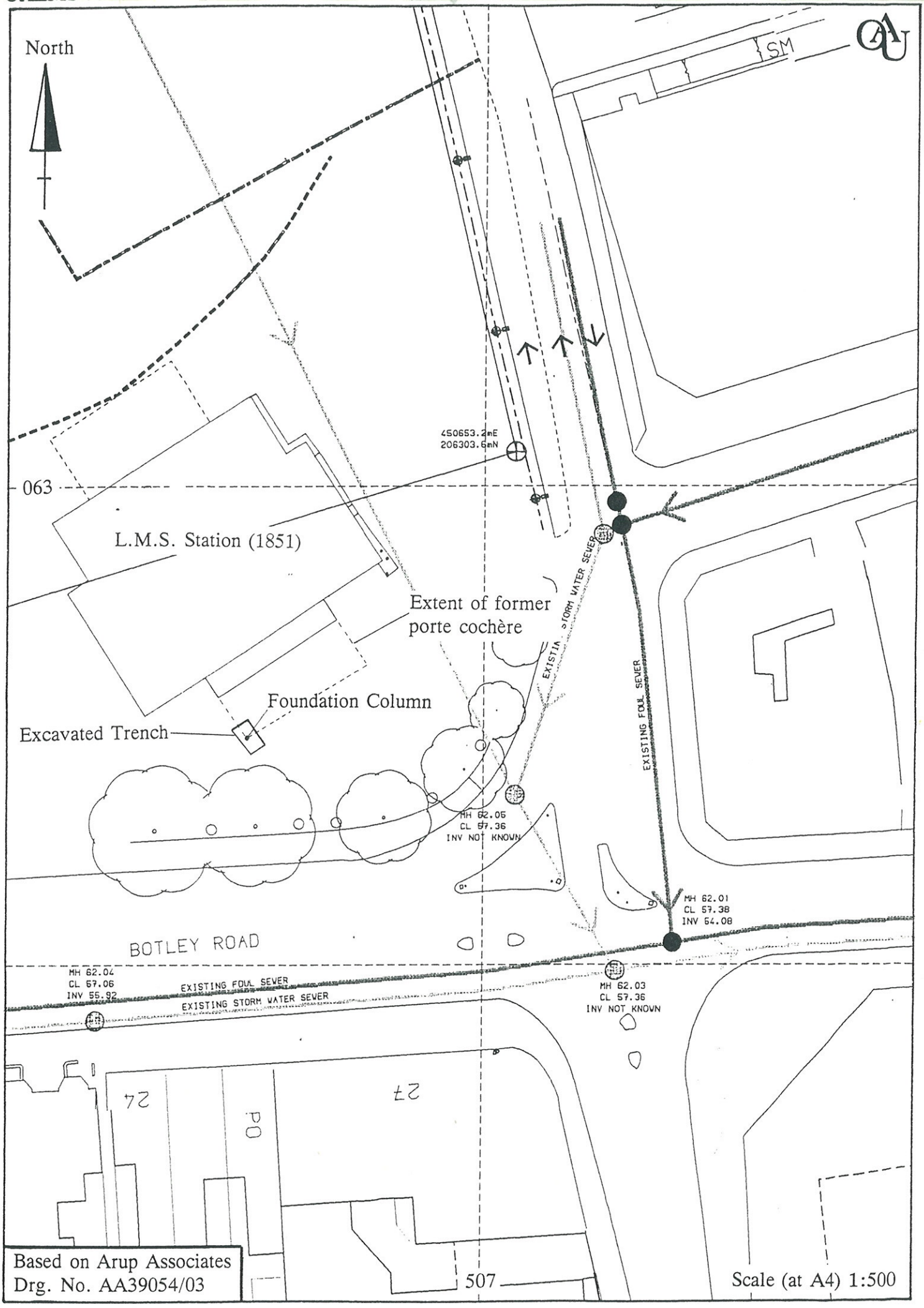


Figure 1: Trench Location Plan

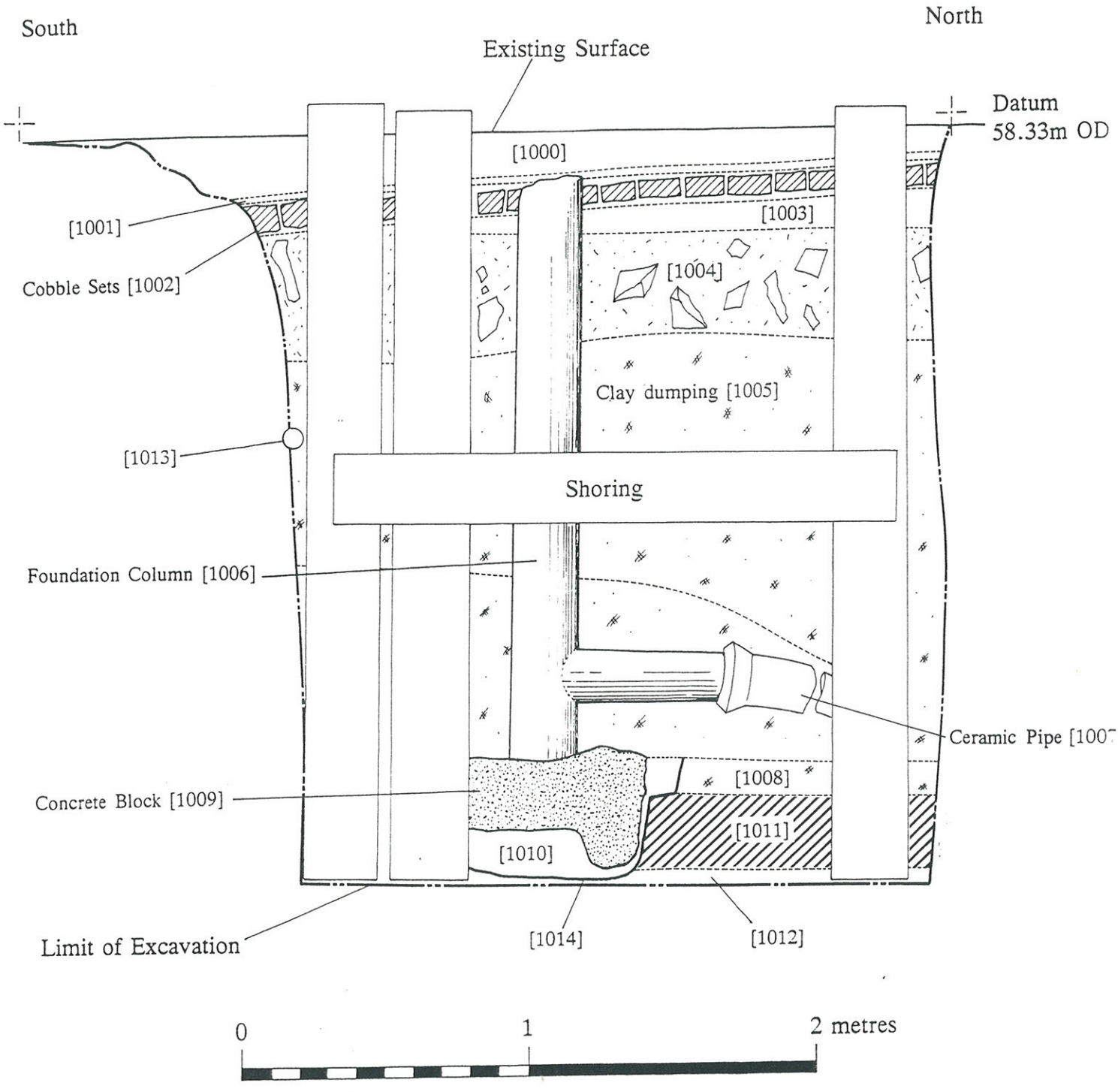


Figure 2: East facing section of trench.

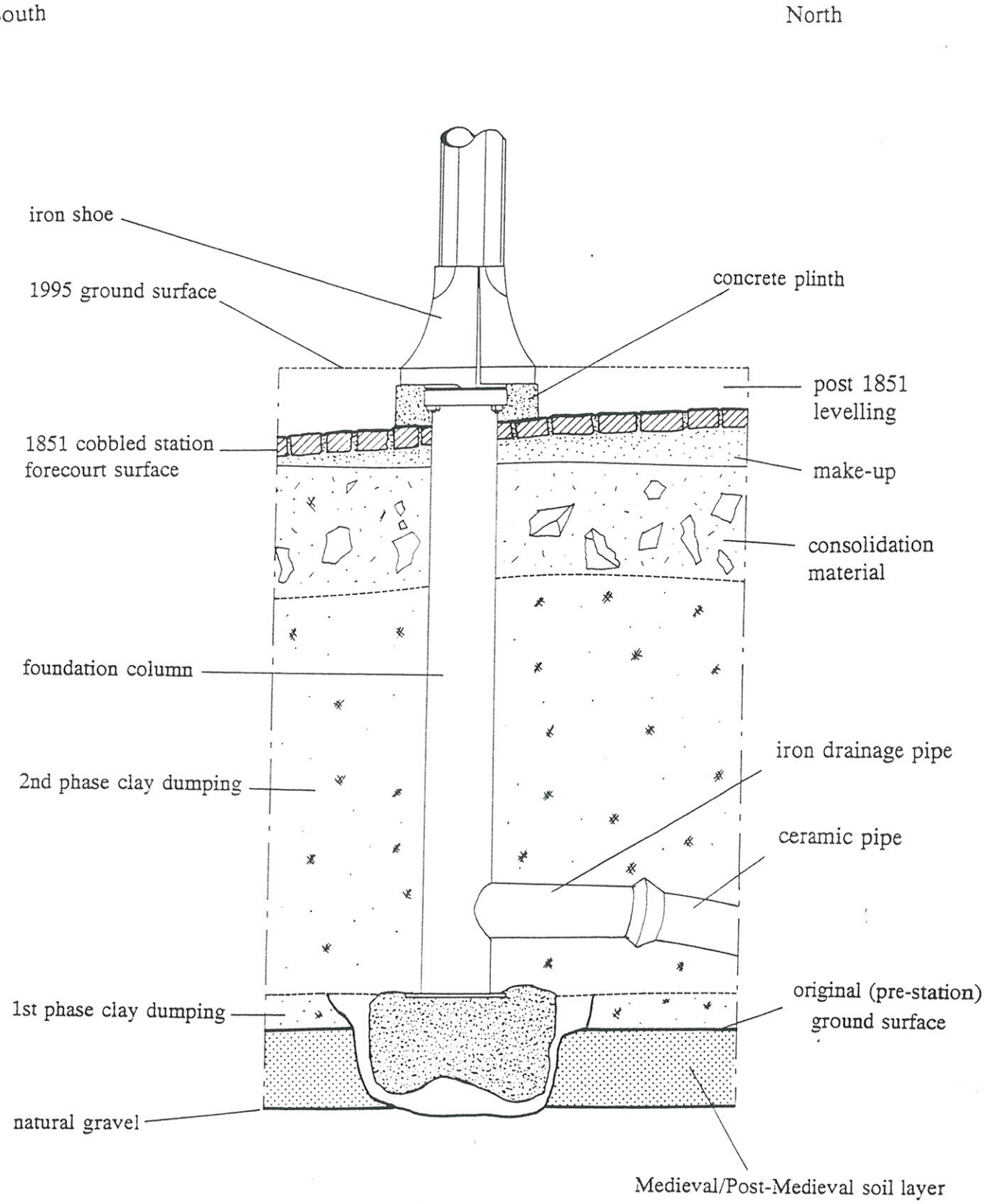
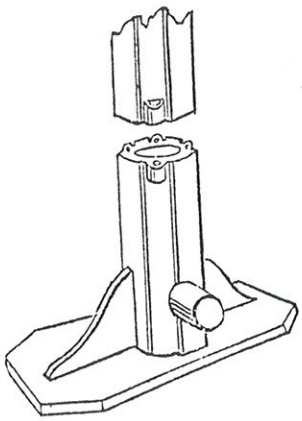


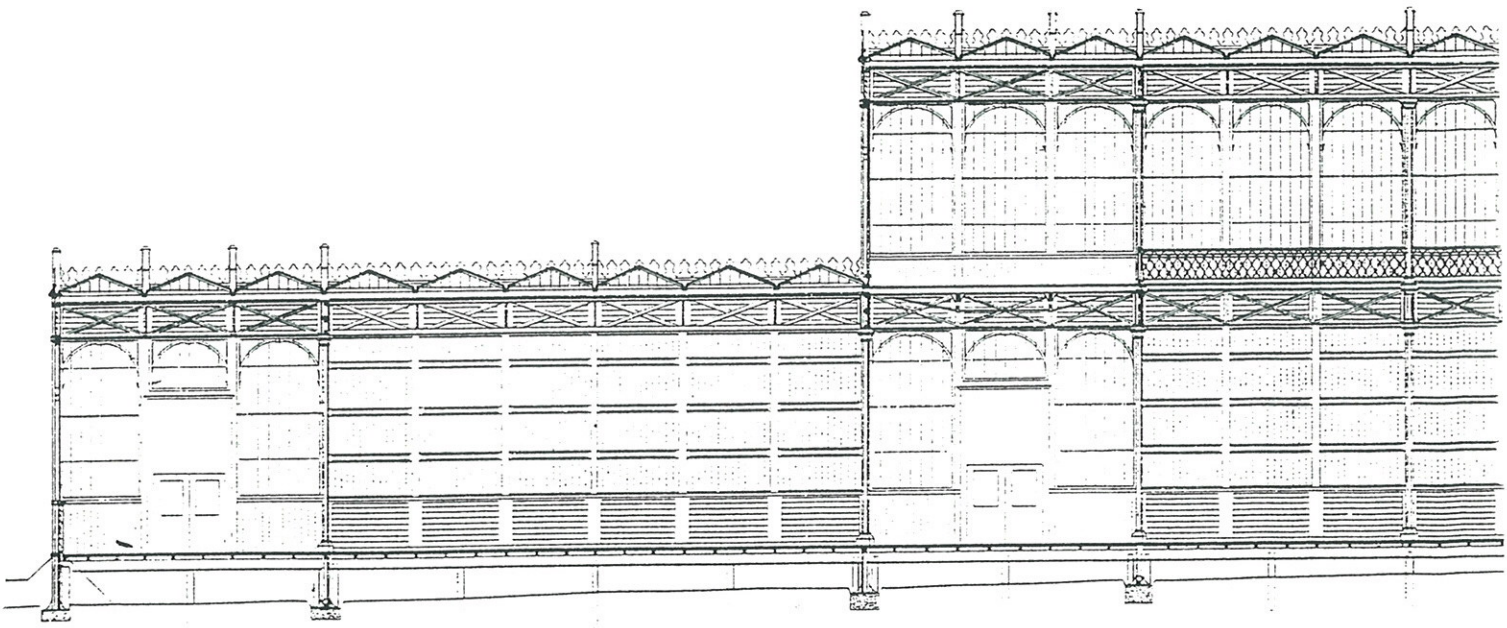
Figure 3: Interpretive reconstructed sectional elevation of foundation column at SW corner of porte-cochere.

THE COLUMNS.

The iron columns are from designs by Sir Charles Barry; and consist of four raised fillets upon a circular column, and although of great strength have a remarkably light and elegant appearance. The columns and their bases are cast in separate pieces of from 15 to 24 feet in length, for the obvious convenience of casting, and the lower joint of the column is a short length of 3 or 4 feet, according to the level of the ground, with the base plate attached. This fitted, and the accuracy of the level again tested, the superior column was fixed on it; having accurately set up the base and bottom joint, or socket, as it may be termed, the lower columns, 18 feet 8 inches high, are fixed upon them by bolts and nuts; then a con-



a) Detail of Column Base from *Crystal Palace Visitors Handbook* of *c*.1853



b) Extract of Crystal Palace Transverse Section showing column bases from *The Building erected in Hyde Park for the Great Exhibition 1851*, Cowper C and Downes C, 1852.

Figure 4: Details of Original Crystal Palace Construction

Appendix D:

Oxford Midland Station and the Crystal Palace

by R. J. M. Sutherland, BA, CEng, FIStructE, FICE

Harris & Sutherland

The Institution's **Special Study Group on the History of Structural Engineering** *intends to promote short articles on subjects of historical interest for publication in* The Structural Engineer *as a fairly regular feature.*

Dr. Norman Davey's paper 'Roman concrete and mortar' published in June 1974, was one such article. As a contrast to 2000 year old concrete, Mr. Sutherland turns, in the paper below, to 19th century iron, and compares the surviving remains of the Oxford Midland Station of 1851 with the drawings and other records of its contemporary, the Great Exhibition Building. Fox Henderson & Company built both and the similarities are so remarkable that it could almost be said that the Crystal Palace still survives, at least in part.

In spite of all that has been written on 19th century construction, and about the Great Exhibition building in particular, records of the Oxford Midland Station are tantalizingly sparse. Thus there are not only gaps in this comparison but there is evidence, again incomplete, of conscious changes of mind or perhaps of a lack of unanimity amongst the designers of the Exhibition Building. Any further information—even conjectures—would be welcome. It is the aims and reasoning of our predecessors which are valid for us today even if some of their techniques are now superseded.

Until recently it had been thought that no trace of the Crystal Palace structure remained. Strictly, none does, but something very similar has survived. Henry-Russell Hitchcock was perhaps the first to draw attention to this[1] in the early 1950s when he wrote:

> 'There at Oxford is an extant sample of the original Crystal Palace construction as authentic as the great monument at Sydenham which burnt down in 1936'.

He was referring to the Oxford Midland Station, originally part of the Buckinghamshire Railway, then of the London and North Western and now abandoned and half demolished but with the remaining part—rather forlorn—used to house a motor tyre business.

Superficially, the Oxford Station—a simple rectangle with a single span of 48 ft across the tracks and columns at 24 ft centres longitudinally (Fig 1)—does not look much like either the Hyde Park Exhibition Building of 1851 or the same building as re-erected at Sydenham. In spite of this even a quick comparison of the components shows that the buildings are at least very closely related.* The column castings are the same in all but their shaft length. The cast iron lattice edge beams at Oxford are identical to the standard 24 ft cast iron floor beams for the Exhibition Building in every detail except the end fixings, the Oxford beams presumably being made from the same pattern altered only enough to substitute a pair of bolts for the famous wedged fixings used in the Exhibition Building (Figs 2, 3 and 4).

While the 24 ft cast iron beams look the same, the main 48 ft wrought iron trusses at Oxford do not at first seem much like the equivalent spans for the Exhibition Building. At Oxford these are of the Pratt type with tensile diagonals only whereas in the Exhibition Building each panel was counter-braced (Fig 5). Closer examination shows this difference to be illusory, in that the redundant compression diagonals in the Exhibition Building were not structural at all, but of wood, introduced, as Downes and Cooper explain, 'merely . . . to preserve the uniformity of appearance of the truss'[2]; that is to make them look similar to the cast iron ones. In the station this refinement was omitted but continuous top and bottom flange plates were added. Virtually all other details are the same except that as with the cast iron beams the wrought iron trusses at Oxford are bolted at their ends instead of being fixed with wedges.

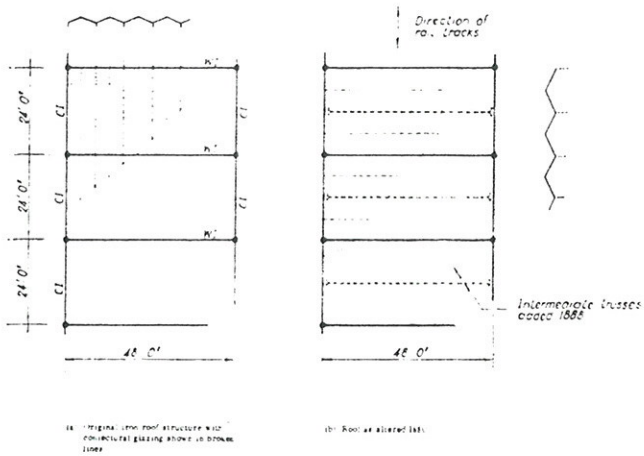


Fig 1. Framing plan of train shed at Oxford

Almost more telling as a comparison than the structural components are the remains of the decorative iron cladding at Oxford which was clearly made from the same castings as in the Exhibition Building, (Fig 6).

Despite minor differences, and to date a lack of firm written evidence, the similarities between the components are such that it seems inconceivable that the buildings could have been built by different people. Certainly the dates tie up; the Great Exhibition Building was opened on 1 May 1851 and the Oxford Midland Station less than three weeks later on 20 May. One contemporary newspaper report refers to the station as 'constructed in a similar manner to the Crystal Palace in Hyde Park' and to Mr. Fox's presence at the opening[3]. This is presumably Charles Fox (later Sir Charles) of Fox Henderson and Company but it would be reassuring to find a fuller reference, especially as Thomas Brassey (also present) was the contractor credited[4] with the construction of the Buckingham Railway and not Fox Henderson.**

Fuller details of the contractual arrangements at Oxford would be interesting. We know that the Exhibition Building was strictly a contractor's alternative the credit for which must be shared between Paxton, who initiated the scheme, and the tenderer, Fox Henderson and Company, who proposed it; the design split is hazy but there is no doubt that all the

*This comparison is made possible by the survival of the working drawings of the Exhibition Building superbly reproduced in Downes's and Cooper's book of 1852.

**The engineer is variously quoted as Robert Stephenson and Dockray; it is likely that both were involved.

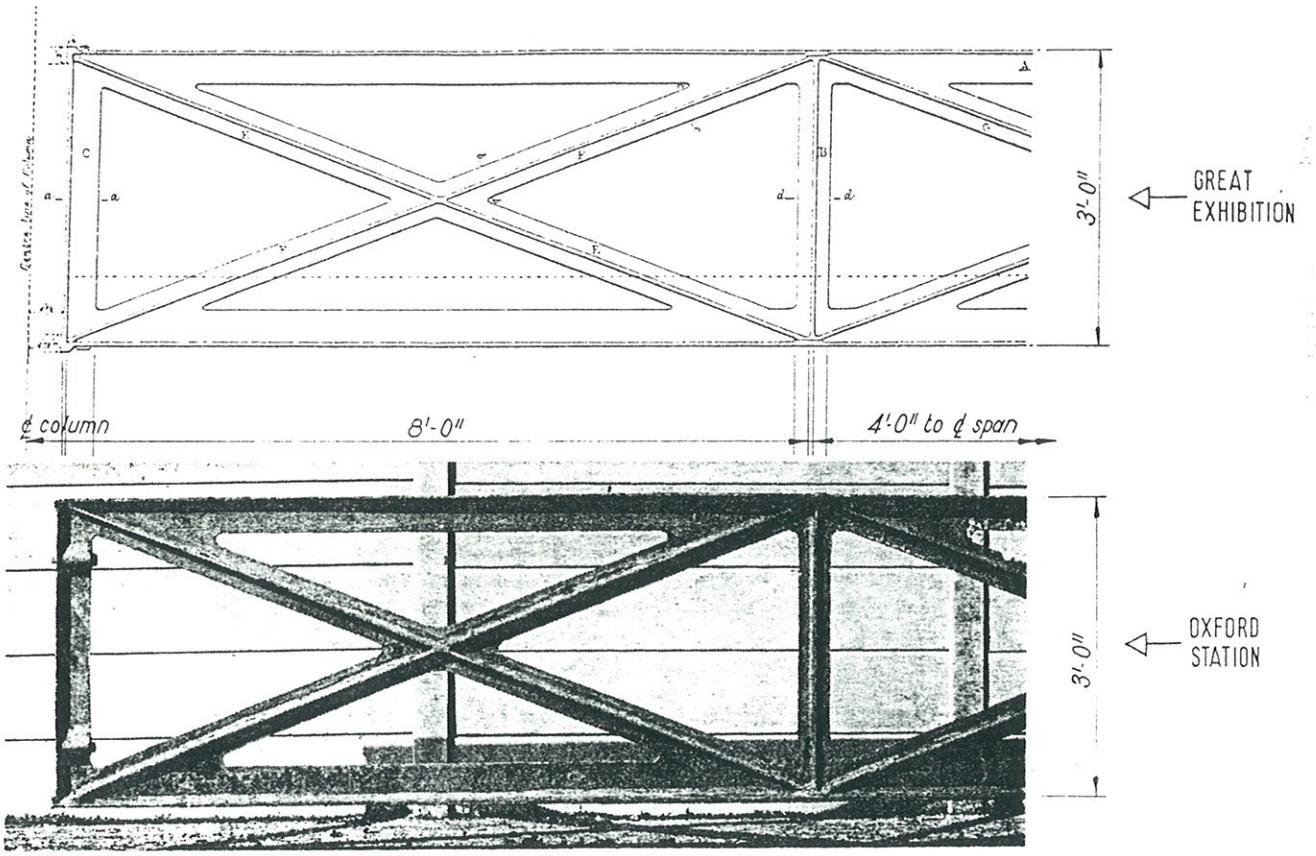


Fig 2. Comparison of 24 ft cast iron beams

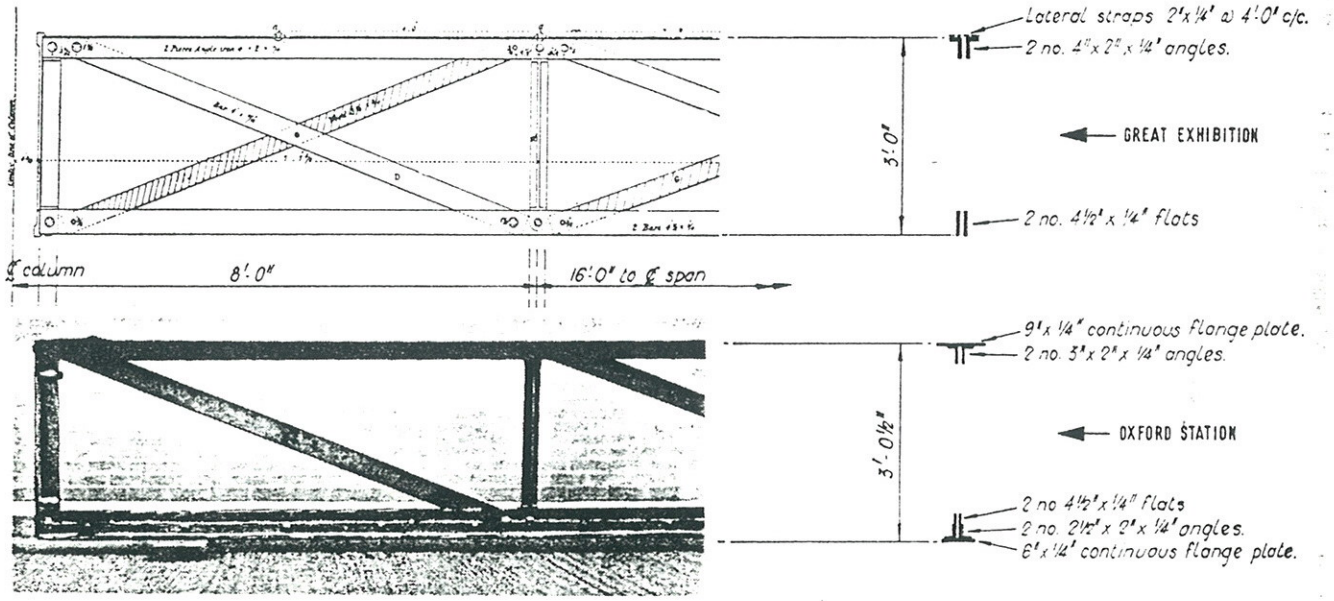


Fig 5. Comparison of 48 ft wrought and cast composite trusses
(Note: non-structural timber diagonals in Great Exhibition trusses shown cross-hatched)

detailing and the whole structural analysis were done by Fox Henderson. Was the Oxford Station again an alternative or did the tender inquiry for the line give only an outline specification for the stations? Were there any other stations as closely related to the Exhibition Building, either on the Buckinghamshire Railway or elsewhere? It seems not but one cannot be sure.

This paper is frankly an interim statement full of questions which others may help to answer. Perhaps even more interesting than the purely factual uncertainties are the doubts on design and intention.

There can be little doubt that the station was the child of the Exhibition Building and not the other way round but it is noticeable that the station was not just knocked up out of the left-overs from the larger contract. The differences point to distinct changes of mind. Were the flange plates to 48 ft trusses at Oxford added for extra bending strength (the load seemed to have been nearly enough the same in both cases) or because the Exhibition ones lacked stiffness laterally, especially during handling? Were the bolted end connections—much sounder to the modern mind—adopted because the original wedging proved less easy and less secure than

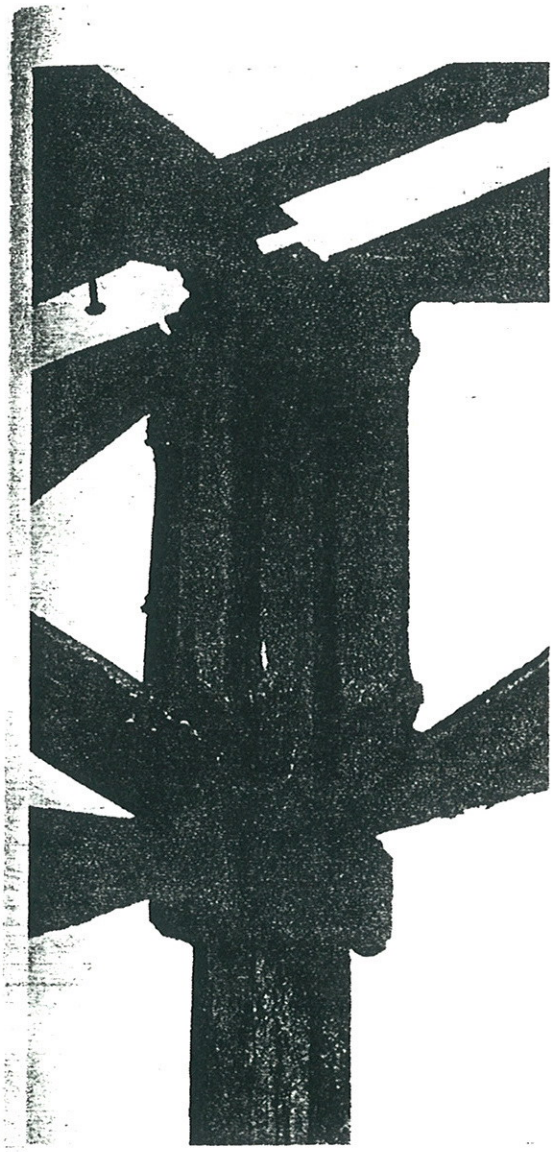


Fig 3. Beam to column fixing at Oxford Station

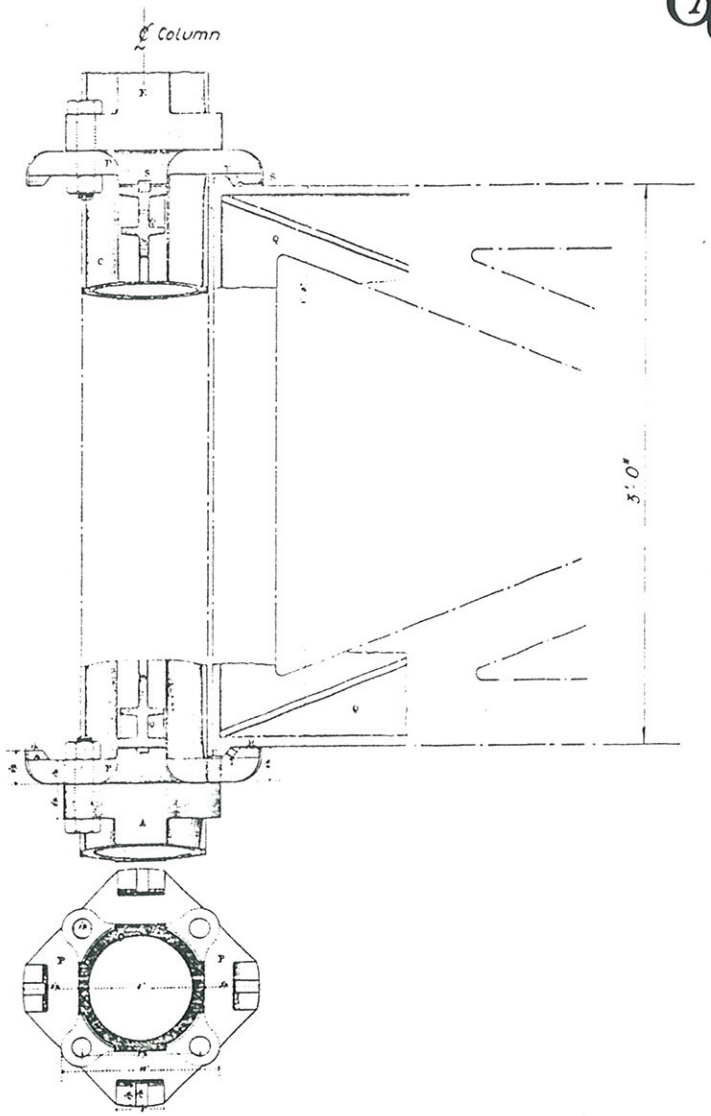


Fig 4. Beam to column connection in Great Exhibition Building

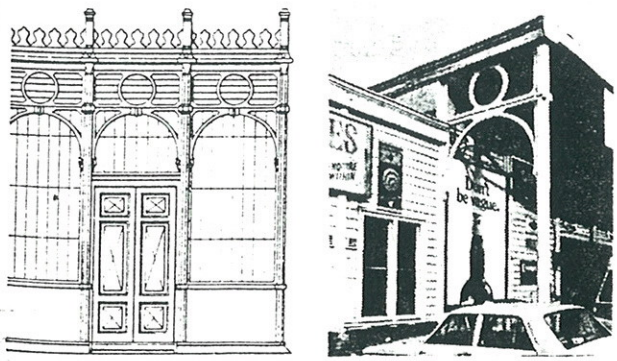


Fig 6. Comparison of decorative cast iron cladding sections
Great Exhibition Building Oxford Station

the published accounts indicated, or was the wedging Paxton's idea which Fox never liked?

Finally what was the original roof covering at Oxford and why was this altered in 1888 when the present crude intermediate frames were introduced which halved the secondary spans and probably altered the direction of glazing. The only surviving drawing[5] which British Railways can provide is dated July 1888 and shows these intermediate frames as new but not what the roof covering was like before. It is at least likely that the original glazing ridges ran longitudinally with Paxton type trussed timber gutter beams (Fig 7) spanning 24 ft between the iron trusses as at the Crystal Palace. The holes in the tops of the trusses are quite compatible with this idea. With poor maintenance, of which there is ample evidence, the gutter beams might well have rotted between 1851 and the 1880s and leaked or even collapsed, after which the whole roofing was changed. If this conjecture is correct it is surprising that the same trouble did not occur at Sydenham in the much longer period until the fire in 1936.

Two complete bays from the demolished part of the structure (six columns, three trusses and four cast iron beams) have been taken into the Science Museum store and it is hoped that there will be a structural gallery in the museum some day large enough to accommodate them. It would then be appropriate to reconstruct a section of the glazing, if only we knew its form. Any photographs or drawings of the station before the changes in 1888 would be more than welcome. If these showed that Paxton gutters were used so much the better. What is more, this type of roof covering would be comparatively easy to reconstruct.

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2. 'The building erected in Hyde Park for the Great Exhibition of the Works of Industry of all Nations 1851. Illustrated by twenty-eight large plates, embracing plans, elevations, sections and details laid down to a large scale from the working drawings of the Contractors, Messrs. Fox, Henderson & Co', by Charles Downes,

Architect with scientific description by Charles Cooper, Assoc. Inst.CE. John Weale, 1852.
Note: a reprint of this has been issued recently by the Victoria and Albert Museum.

3. *Jackson's Oxford Journal*—Saturday 31 May, 1851.
4. Sir Arthur Helps *Life and labours of Mr. Brassey*, 1872. Charles Walker, 'Thomas Brassey' *Railway Builder*, 1969.
5. Drawing No. 66792 L&NWR Oxford Passenger and Goods Station: July 1888.

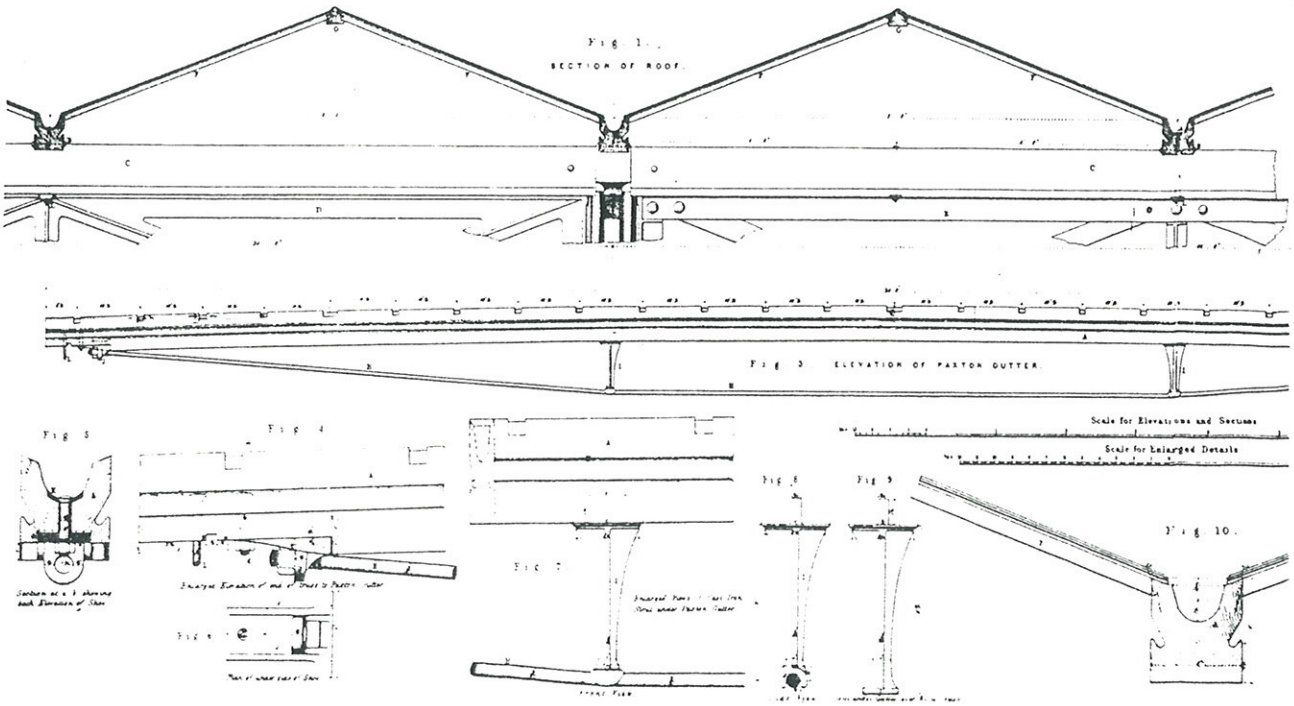

Fig 7. Paxton gutter and associated glazing as used in the Exhibition Building and possibly for the original roof covering at Oxford

The Drury Medal Competition 1975

The conditions for the 15th biennial competition for the Drury Medal, founded by the late Mr. F. E. Drury (Past-President) are available.

It will be recalled that Mr. Drury established the competition to encourage Students and Associate-Members of the Institution to design adventurously. In addition to the medal, the winner will receive a premium of £100.

The alternative subjects set for the 1975 Drury Medal Competition are:

An amenities centre, *or*

A structures testing laboratory.

The conditions of the competition are as follows:

1. The competition is open to any Student or Associate-Member of the Institution who, at the date of his entry, is not over 27 years of age.
2. The conditions, subjects, last date of entry, and last day for submission of completed work will be announced in *The Structural Engineer*. Notification will also be given direct to schools, colleges and universities which conduct courses in structural engineering which may be:
   (*a*) a complete structure of moderate size, *or*
   (*b*) a specified part of a structure or building, *or*
   (*c*) a lifting appliance.
3. The subjects of the competition will be designs of a structural character, that is to say involving structural design rather than planning. The candidate will be required to submit a complete engineering design.
4. The subjects of design and the special conditions of the competition will be arranged by an *ad hoc* committee consisting of the President for the year, and the Chairmen for the year of the Education and Examinations, Science and Research, and Literature Committees.
5. The competitor shall submit:
   (*a*) a general design philosophy not exceeding 500 words;
   (*b*) such calculations as are necessary to satisfy the requirements of the question (preferably on A4 size paper written on one side only);
   (*c*) supporting drawings as specified.
6. In order to ensure that the design submitted is the unaided work of the competitor, the drawings, calculations, etc., submitted shall be endorsed by the candidate: 'I declare that the work I hereby submit is my own unaided work'. The declaration shall be signed by the competitor and be either counter-signed by a corporate member or be certified as made before a JP or a Commissioner for Oaths.
7. The work submitted will be examined by a jury of not less than five persons, to be appointed by the Literature Committee, who will also, if they so desire, interview such candidates as they may select. The jury will include the Chairmen of the Education and Science Committees.
8. The drawings submitted, unless reclaimed by the candidate, will become the property of the Institution.

Those eligible are invited to apply for full details to the Secretary at 11 Upper Belgrave Street, London SW1X 8BH. The closing date for receipt of entries is 30 September 1975.

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