

The Monk Bridge Iron and Steel Works

Grid Reference: SE 2903 3307

Archaeological Buildings Recording

Assessment Report No. 971.1(2)

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OASIS SUMMARY FORM

PROJECT DETAILS	
OASIS identifier	arcus2-54190
Project title	The Monk Bridge Iron & Steel Works
Short description of the project	Detailed building recording of the standing remains of the former Monk Bridge Iron & Steel Works which had been incorporated into the Doncasters Monk Bridge Works. Recording included both 19 th and early 20 th century structures such as the company offices fronting onto Whitehall Road, the Tyre Mill, Rolling Mill, Smithing Shop and Puddling Furnaces. A number of the earlier structures were metal framed with cast iron columns, lattice girders and wrought iron roof trusses. Although not all of the mid - late 20 th century buildings were recorded to the same level of detail a through photographic record was made of the exterior, interior and setting of each structure.
Project dates	January – March 2006
Previous/future work	Previous works include two desk-based assessments:- Fitzgerald, R., 2004, <i>Archaeological Desktop Assessment of the Monk bridge Ironworks</i> , Whitehall Road, Leeds. Structural Perspectives Ltd., Unpublished Report; Kinchin-Smith, R. 2004. <i>Monk Bridge Forge: Historic Building Assessment</i> . RPS unpublished report; a standing buildings assessment. Future works may include a assessment and full client reports for archaeological mitigation works (subsurface) and a monograph.
Monument type and period	Iron & steel works – post-medieval (c.1850s-2005)
Significant finds (artefact type and period)	Paper documents and plans relating to building alterations c. 1870s-1970s
PROJECT LOCATION	
County/Parish	West Yorkshire, Holbeck, Leeds
Site address	The Monk Bridge Iron & Steel Works, Whitehall Road, Holbeck, Leeds
Site co-ordinates	NGR SE 2903 3307
Site area	3335m ²
Height OD	Max: 30.245m / Min: 27.115m
PROJECT CREATORS	

Organisation	RPS Planning & Environment; ARCUS	
Project brief originator	WYAAS	
Project design originator	RPS Planning & Environment	
Project supervisor	Mark Douglas	
Project manager	Oliver Jessop	
Sponsor or funding body	BAM (formerly HBG Properties Ltd)	
PROJECT ARCHIVES		
Archive Type	Location/Accession no.	Content (e.g. pottery, metalwork, etc)
Physical	n/a	n/a
Paper	West Yorkshire Archives: Leeds; HER Wakefield	report, context sheets, plans, sections, photographs
Digital	West Yorkshire Archives: Leeds	pdf copy of report
BIBLIOGRAPHY		
Title	Archaeological Building Recording of the former Monk Bridge Iron & Steel Works, Whitehall Road, Holbeck, Leeds, West Yorkshire	
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Author	Oliver Jessop and Mark Douglas	
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NON-TECHNICAL SUMMARY

ARCUS were commissioned in December 2005, by RPS Planning and Environment, on behalf of their client BAM (formerly HBG Properties Ltd), to undertake a programme of archaeological building recording in advance of the demolition of the former Monk Bridge Iron and Steel Works, Whitehall Road, Holbeck, Leeds, West Yorkshire (NGR SE 2903 3307).

Whilst the demolition was carried out in advance of applying for planning consent, the historic significance of the structures was recognised and a programme of recording was agreed with the West Yorkshire Archaeology Advisory Service by RPS Planning and Environment.

The fieldwork was undertaken in January 2006, and included the compilation of room data sheets, a comprehensive photographic survey and the measured survey of a selection of buildings. Archive research and an analysis of available map evidence were also undertaken, and a structural watching brief was carried out during the demolition of all buildings on site in March 2006. The identification of a painting of the site dated to 1855 has provided additional evidence for the layout and former working practices from the early years of Monk Bridge Iron Works prior to its expansion into steel production.

Monk Bridge Forge was established by Stephen Whitham in 1851, and was purchased by James Kitson in 1854, to supply and supplement his locomotive factory in Hunslet, Leeds. Rapidly developed by the Kitsons during the 1850s-1870s, the forge became firmly established as one of the key suppliers of high quality iron and steel forgings for much of Leeds' expanding locomotive-building industry. By 1900 its products were being shipped all over the world and the plant was renowned as a market leader. The plant also supplied large forgings to the War Office and the Admiralty, and thus came under government control during both the First and Second World Wars. It was badly affected by the Depression, and its prominence declined after the war, the plant closing completely in 1949. Doncasters of Sheffield bought the site in 1951, re-equipping it initially for producing dies and engine valves for the motor industry. Doncasters were quick to appreciate the future importance of the jet turbine and, following extensive investment and modernisation in the 1950s-60s, output was concentrated upon the production of turbine blades

for gas turbines and the developing jet-aviation industry in Britain and abroad.

The continued use of the site, undergoing numerous phases of reorganisation and use is reflected within the range of buildings that survive. These have varied levels of architectural merit and whilst none can stand alone as being considered of national importance, many have regional and local historic significance. These include large workshop spaces and former production sheds, which make effective use of both wrought roof trusses and cast iron columns to construct large and spacious buildings. The surviving brick range fronting Whitehall Road was also of interest, incorporating numerous buildings that include the 19th-century offices with elaborate architectural detailing. The welfare facilities provided on the site are also of some interest. It is noticeable that the provision of employee welfare began to increase through the mid- to late 20th century, which is reflected in the appearance of such buildings on the site from the 1950s onwards.

This survey has been able to challenge and refine previous interpretations of the site, most notably that building E1 was not the site of Kitson' s earliest move into the production of crucible steel as previously believed. A much more efficient method of steel production was installed on the southern part of the site in the 1880s and it is unlikely therefore that the interpretation of a small cluster of circles on the 1923 site plan as a crucible hearth utilising the 'Sheffield' method is correct.

1 INTRODUCTION

1.1 Scope of Report

This report presents the results of a programme of archaeological building recording at the site of the former Monk Bridge Iron and Steel Works, Whitehall Road, Holbeck, Leeds, West Yorkshire (**Illustration 1**). ARCUS were commissioned in December 2005 by RPS Planning and Environment, on behalf of their client BAM (formerly HBG Properties Ltd), to undertake a scheme of archaeological building recording.

Whilst the demolition was carried out in advance of applying for planning consent, the historic importance of the site was recognised and a programme of recording was agreed with the West Yorkshire Archaeology Advisory Service (WYAAS), to provide a 'targeted' record of those buildings within the site boundary that retained historic value and local significance.

1.2 Site Location

The site is located approximately 1km to the south-west of Leeds city centre at NGR SE 2903 3307 (**Illustration 1**), in the district of Holbeck. This part of the city was once heavily industrialised and is currently undergoing a period of change and redevelopment. The surveyed area is actually only approximately half of the original extent of the Monk Bridge Works, with the remainder (now largely demolished) being situated on the southern side of Whitehall Road.

The site has an asymmetrical boundary that encompasses an area of c.3335m² and is between 27.115m and 30.245m OD. It is bounded to the south-east by Whitehall Road (formerly the Leeds to Halifax turnpike), to the south-west by the embankment of the former Leeds and Bradford railway, to the north-east by the River Aire and the Leeds and Liverpool Canal and to the north-west by the Grade II Listed River Aire viaduct.

At the time of the survey the site was occupied by a number of office and manufacturing buildings recently vacated by Doncasters. The buildings range in date from the mid-19th to the late 20th century and are constructed from a mixture of brick and steel frames in a variety of structural forms.

1.3 Previous Survey

The section of the former Monk Bridge Iron and Steel Works to the north of Whitehall Road has been the subject of two earlier studies:

- Fitzgerald, R. 2004. *An Archaeological Desktop Assessment of the Monkbridge Ironworks, Whitehall Road, Leeds*. (Structural Perspectives, unpublished)
- Kinchin-Smith, R. 2004. *Monk Bridge Forge: Historic Building Assessment*. (RPS Planning and Environment, unpublished)

These two reports discuss the historical development of the site, describe each building, and identify historic details considered to be worthy of further study.

The section of the former works located to the south of Whitehall Road, which is not included within the remit of this survey, has been subject to an archive study by Robinson Consulting who were able to digitally photograph the original engineering and architectural drawings held by the Leeds City Archives in Sheepscar.

- Robinson Consulting. 2005. *Digital Photographic Survey of Archive Documents from the Monkbridge Iron Company*. (Robinson Consulting, unpublished)

These drawings are a valuable addition in understanding the overall scale and manufacturing processes throughout the whole of the former works that spanned both sides of Whitehall Road; however, the focus of this report is on the northern part of the Monk Bridge works, so they are used only for general reference.

2 AIMS AND METHODOLOGY

2.1 Aims and Objectives

The aims of the recording programme, as specified in the project brief (**Appendix 1**), were:

- to identify and objectively record by means of photography and measured survey, evidence for the original and subsequent historical form and functions of the buildings;
- to present this information as an archive and as an illustrated report;

- to combine the results and interpretations where appropriate from previous surveys and reports to consider the development of the site as a whole.

2.2 Methodology

The archaeological fieldwork (on-site recording and archival research) was carried out in accordance with guidelines issued by the Institute of Field Archaeologists (IFA 1999) and with current industry best practice. In summary:

- the building numbering system (from Building A to K) formulated by RPS was adopted as the standard for the identification of each individual structural element across the site;
- individual room description sheets (numbering 148 in total) were compiled for every room or discrete internal space within each of the buildings on the site;
- a full photographic survey was made of all elements of the buildings, utilising tripod-mounted medium format black and white photography for full views, accompanied by 35mm black and white views and details;
- the most recent plan of the site, dated 6/9/02, was utilised as the basis for the majority of the drawn record on the site. This was annotated and adjustments were made for anomalies;
- the measured surveys conducted on site consisted of; a plan and cross section of building B5, a plan, south and east elevation and cross section of building E1, and a plan and cross section through building G1/G1.1;
- the drawing conventions employed conformed to English Heritage Guidelines, as stipulated in RCHME (1996) *Recording Historic Buildings – a Descriptive Specification* and English Heritage (2006) *Understanding Historic Buildings: a Guide to Good Recording Practice*;
- historic archives in the form of deposited building plans and engineering drawings retained within the former Doncasters drawing office on site and those held by the City Archives at Sheepscar were examined and a selection digitally scanned for reference;

- a historic painting of the works c.1855 that was retained by the former owners, Doncasters, was examined and photographed at their company offices in Melbourne, Derbyshire.

2.3 Fieldwork Programme

The project was managed by Oliver Jessop (MIFA) and the fieldwork programme was supervised by Mark Douglas. Fieldwork was undertaken in January 2006, with assistance from Stephen Duckworth, Alex Rose-Deacon, Lucy Dawson and Howard Whiting. The site surveyor was Chris Breeden and photographer Simon Jessop. An intermittent structural watching brief was maintained during March 2006 during the demolition of the standing structures. Archive research was undertaken by Stephen Duckworth and Oliver Jessop. Reporting was by Oliver Jessop and Mark Douglas. Illustrations were produced by Chris Breeden, Kathy Speight and Panagiotis Patlakas.

2.4 Historical Archives

Discarded within one of the former drawing offices on the site (room B2F3) were a significant quantity of illustrations, plans, sections, elevations, planning submissions and engineering constructional drawings relating to the 20th-century operations on the site. This material is currently located with the project engineers, BSCP LTD, Consulting Engineers, Smeaton House, Leeds, LS16 7SR, and it is their intention to deposit this material with Leeds Archives. Prior to its removal from site, the opportunity was afforded to digitally scan a selection of the drawings (mainly those from the early period of the works), as well as to digitally photograph the existing site archives already deposited with the Leeds Archives in Sheepscar. Many of the records which related to the Doncasters' ownership of the site were only briefly examined and as such only limited reference to them is made within this report.

Relevant extracts from these documents have been reproduced in colour as **Illustrations 23-33, 35-39, 42-45, 49-52, 54, 60-61, 63-68, 71-73, 75-82, and 84-85**. The archive plans, elevations and sections largely correspond with those figures presented by Fitzgerald (2004), apart from his figure 15, depicting building B5. Unfortunately, upon the ARCUS visit to the archives, they were unable to locate this document and the Fitzgerald report will be referenced as required.

3 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

3.1 Historical Context

In addition to the historical account presented in the sections below, detailed histories have previously been written regarding this site and its historical context (Fitzgerald, 2004; Kinchin-Smith, 2004) and they should be consulted in conjunction with this document to fully appreciate the historic development of the former Monk Bridge Iron and Steel Works and latterly Doncasters.

3.2 The Industrial Development of Leeds

The development of the engineering industry in Leeds took place within the wider context of the rapid expansion of the city, which was characterised by an industrial tradition dating to the early part of the 14th century.

From c.1350 to 1750 the manufacture of woollen cloths was the characteristic industry of the Leeds area, being the source of employment for the majority of inhabitants by the end of the 16th century. At this early date, some of the larger Leeds clothiers were employing 20 or more people in one workshop, when the domestic system of production was still generally dominant. A town charter granted in 1626 recognised the economic importance of Leeds, particularly in respect of the woollen cloth industry. During the first half of the 18th century, as the local industry became more sophisticated, the production of the finer, worsted cloth became significant. The early establishment of a thriving woollen industry provided an important foundation for the later development of engineering industries in Leeds. Trade was stimulated by the establishment of the Aire and Calder Navigation under an Act of 1699, which placed Leeds at the head of river navigation to the Humber estuary. The city flourished as a centre of international wool textile trade, with the Cloth Hall of 1711 being enlarged in 1756 and 1775.

Other 18th-century improvements included the development of the transport infrastructure, including 'the River Aire Navigation' and the trans-Pennine link 'the Leeds to Liverpool canal' , although this was not completed until 1816.

During the late 18th century, the local woollen industry began to move to centralised, multi-storey factories, employing machinery to increase output. Thomas Lloyd' s Armley Mills (north-west of the town centre) of 1788-90 was

followed in 1792 by the important innovation of Benjamin Gott' s Bean Ing factory, just upstream from Monk Bridge. This was the world' s first large integrated woollen mill. In the previous year, John Marshall and Thomas Benyon established the first mechanised flax-spinning mill, at Holbeck, just south of the site later developed as the Monk Bridge Iron and Steel Works.

After 1750, the coal mining industry had also developed, with the sinking of deeper pits, in contrast to the numerous shallow workings established by the early 18th century. The Middleton Colliery obtained the earliest Act of Parliament for the laying of a railed way, running to the south bank of the River Aire near Leeds Bridge, bringing cheap coal directly to the town.

Thus, by the end of the 18th century, the Holbeck area was being developed with modern, mechanised industrial sites, which were creating an increasing demand for the products of the latest technological developments, whether in the established woollen industry, or the dependent associated transport and mining industries which flourished as the use of steam power became widespread. Flax mill owner John Marshall' s mechanic, Matthew Murray, had diversified with partners Fenton and Wood in 1797 to establish the Round Foundry in Holbeck. Murray' s foundry produced woollen industry machinery but also pioneered steam engine improvements, including the first successful steam locomotive, which ran on the Middleton Colliery Railway in 1811.

In the second quarter of the 19th century, the local railway network grew, first with the arrival at Marsh Lane of the Leeds and Selby Railway in 1834, then with George Hudson' s North Midland Railway from Derby, which reached its initial Hunslet Lane terminus one mile south of the city, in 1840. This was subsequently extended to a new terminus at Wellington Street, shared with the newly opened Leeds and Bradford line in 1846. As schemes to build new routes into the city were promoted in the 1840s, a single combined city-centre station was proposed. In 1846-9 these ideas crystallised in the idea of a *Leeds Central* station, shared by the Leeds, Dewsbury and Huddersfield, Leeds and Thirsk and Manchester and Leeds Railways, which approached the city over the large viaduct, bridging the River Aire and the Leeds to Liverpool Canal north of the Monk Bridge.

This rapid proliferation of lines during 'The Railway Mania' resulted in a much-increased demand for steam locomotives, initially to run on the main lines and later for export and for use on the various connected industrial

systems at collieries, ironworks and other sites. The Leeds engineering firms were well-placed to serve this new market, and railway locomotive engineering grew to be a major industry on a scale only rivalled in the UK by Glasgow. The most distinctive feature of the Leeds locomotive industry was its nucleation in Hunslet, with several firms specialising in the production of small industrial locomotives, mainly for home use, and larger engines built for export markets.

The origin of Monk Bridge Iron and Steel Works lay in the expansion of Leeds' locomotive-building industry and is indirectly related to the evolution of Matthew Murray's pioneering Round Foundry nearby in Water Lane. After Matthew Murray's death in 1826, his son-in-law Robert Jackson replaced him in the renamed firm of Fenton, Murray and Jackson, who quickly became leading locomotive builders, sub-contracting to Robert Stephenson and Daniel Gooch, notably. Fenton, Murray and Jackson ceased trading in 1843, whereupon several of their employees sought local continuation of business elsewhere.

James Kitson, a local organ maker, had moved to the Hunslet area around 1835 in order to start manufacturing railway materials. By 1837 Kitson had commenced the erection of his first locomotive in part of an old woolen mill near the North Midland Railway terminus in Hunslet, at the site that became the Airedale Foundry of Todd, Kitson and Laird (Kitson and Co. from 1863), a concern that was employing 1,500 people by 1887 and which by 1912 had produced over 4,500 locomotives (Fortunes Made in Business, 1887, 321 and VCH Vol 2, 1912, 51).

Todd, Kitson and Laird soon broke up, but James Kitson's pioneering work has established Hunslet as a major locomotive building centre, with the Airedale Works soon being joined by the Railway Foundry (1838 to 1858) and, after its closure, by Manning, Wardle and Co (1858), Hudswell Clarke and Co (1864) and the Hunslet Engine Company (1864), all of which were sited on, or near, Jack Lane, Hunslet.

3.3 The Monk Bridge Iron and Steel Works

Against the background of a thriving local engineering and engine-building industry, The Monk Bridge Iron and Steel Works was founded in June 1851 by Stephen Whitham, proprietor of the Providence Foundry, to produce high-

quality wrought iron. The Monk Bridge site was ideally situated for transportation, Whitham's original site being bounded to its east by the Leeds and Liverpool canal and to its north by the River Aire viaduct of the Leeds and Thirsk and the Leeds, Dewsbury and Huddersfield railways. Whitham's site was bounded to its south by the Whitehall Road, at that time the principal turnpike from Leeds to Halifax, and to its west by the short-lived Holbeck pasture extension to the Wortley, Armley and Bramley District Road. Slightly to the west (and latterly forming the western boundary of the expanded site) lay the Leeds and Bradford Railway.

The works appears to have been an immediate success and was purchased by James Kitson in September 1854 for his two sons; the early layout of the works layout is depicted on a map by Masser published in 1858 (**Illustration 6**). The acquisition enabled the company to safeguard its supply of quality 'Best Yorkshire' or 'Monk Bridge Best Yorkshire' wrought iron (and later steel) for locomotive engineering purposes. It also allowed the company to develop a specialised facility capable of producing quality forgings for highly stressed locomotive components, notably axles and tyres, the repeated failure of which was then causing locomotive engineers and builders great concern.

Under the Kitsons, steel-making was introduced, initially for the early manufacture of tyres for locomotives. The growth in demand for quality steel forgings, including sales to rival builders and a burgeoning export market, prompted the Kitsons to purchase further land to the south of the Whitehall Road in August 1864 for the construction of a purpose-built steelworks (not examined in detail within this survey). Two huge buildings were constructed on the newly-purchased site to house the steel works and steel billet and tyre mill, first depicted in 1866 (**Illustration 7**).

Despite the advent of the Bessemer and Siemens-Martin processes in 1856 and 1866, these processes were not suited to the local ores or the quality of steel required. Thus the Kitsons are said to have employed the expensive Huntsman crucible process, invented in Sheffield in 1740, until 1884, when a small Siemens-Martin open-hearth furnace of four tons charge was installed, initially charged using imported (low phosphorous) Spanish ore. By 1887 the furnace charge was 10 tons. The subsequent purchase of the White Horse or York Road ironworks, established in 1865 by R and W Garside and using the same sources of coal and iron ore as the famous Low Moor ironworks, gave

the Kitson concern complete vertical integration (*Fortunes Made in Business* 1887, 343 and 350; *Leeds Contemporary Sketches Illustrated* c.1895, 27-28).

In 1886 the Monk Bridge Iron and Steel Company was converted into a private limited company under the directorship of Sir James Kitson (the younger James), Frederick Kitson his nephew and Albert Kitson his son (*Leeds Contemporary Sketches Illustrated* c.1895, 26). It then employed three rolling mill beam-engines of 1,300 hp, two engines of 150 hp and thirty smaller engines varying between 4 to 30 hp, thirty boilers generating nearly 1000 hp and fourteen steam hammers varying in weight from 6 cwts to 15 tons, with twenty Siemens gas-producers generating fuel for the site's furnaces (*Fortunes Made in Business* 1887, 343). By 1900 there were four mill engines, three of 1,000 hp, a further mill engine of 60 hp, thirty other engines of 4-30 hp, thirty boilers generating nearly 1500 hp and 14 steam hammers varying between 6 cwt and 15 tons (*The Imperial Review* 1936, 17).

With the introduction of the Siemens Martin Open Hearth Acid method of steel making, the Kitsons quickly realised the value of their product for railway work owing to its adaptability to meet the increasingly stringent requirements of railway and other engineers. Thus further Siemens-Martin open-hearth furnaces of increasing capacity were installed to supply the steel tyre and billet mill and by 1885-90 the plant was also producing cast-steel wheel centres (*Leeds Contemporary Sketches Illustrated* c.1895, 28).

After the death of Sir James Kitson in 1911, the firm was reconstituted as a public limited liability company. The reputation of the plant, the high quality of its products and its capacity for producing the largest forgings meant that it was taken under Government control at the outbreak of the First War and it supplied large quantities of material to the War Office and Admiralty. In 1936 the works was again described in print. The casting shop not only produced ingots of various sizes but also other parts both large and small for use on locomotives and rolling stock. Presses for working billets were installed of progressively larger sizes, from small forging hammers to a 2,000 ton hydraulic press capable of dealing with very large ingots. The plant also included a heat treatment department with furnaces capable of heat treating large items such as axles, tyres and rings. The machine shop was capable of slicing ingots for the manufacture of tyres for locomotives, together with extensive machining and turning facilities for producing locomotive axles (*The*

Imperial Review 1936, 17).

The Monk Bridge Iron and Steel Works survived the depressions and closures of the 1920's and 1930's that affected many of Leeds heavy industries, although iron making was phased out completely. It was taken under Government control again during the Second War, but once peace returned it was clear that steam locomotive manufacture was slowing down and that the Leeds producers were failing to develop fast enough to remain in the vanguard of diesel and electric locomotive manufacture to retain markets at home or abroad. As a result the company was finally wound up in 1949.

In 1951 the derelict Monk Bridge Iron and Steel Works was purchased by the Sheffield forging company Daniel Doncasters. This firm had grown during the 1940s into a leading supplier of forged steel tools and valves to the automotive industry and today remains one of the longest continuously operating industrial manufacturing companies in the world.

Whilst initial orders were for the die and valve forging business, Doncasters had been involved with the production of the Whittle jet engine and were quick to understand the potential of the invention and the associated demand for forged turbine blades manufactured to the most exacting standards and tolerances. At the time of the take-over, a jet-powered civilian airliner was under test at De Havilland (the Comet) and military jet engines were urgently needed for the war in Korea. Doncasters' Sheffield plant was already busy with the manufacture of jet blades and it was decided that the Leeds site should be given over, at least in part, to the manufacture of these difficult precision components. Significant investment followed and by 1953 the Doncasters Monk Bridge site was rivalling its parent company in size, making virtually nothing but turbine blades. Ever larger presses were installed on the northern (former iron works) part of the site and in the period 1956-65 a number of new buildings were constructed, or existing ones reconfigured or re-clad in a distinctive house style.

Further investment followed in the late 1960s and early 1970s, following on the decision to manufacture the turbine blades for the Rolls Royce Olympus engine on the site. The site continued to develop, becoming one of the world's major suppliers of turbine blade forgings to the aerospace and industrial gas turbine industries. Numerous additional screw presses were installed, with capacities from 1,000 tons to 14,000 tons.

By the end of the 20th century the southern (former steel works) half of the site had become redundant and most of the buildings in that part were demolished. By 2005, the remaining northern operations had been relocated to Sheffield and Wales, and the land was sold for redevelopment.

3.4 Analysis of Historic Mapping

The historic mapping available for the Whitehall Road area of Leeds is relatively good, with numerous Ordnance Survey map editions and also a selection produced by local cartographers. In the report on the site by Kinchin-Smith (2004) many of these early maps and deed plans are reproduced, a number of which predate the construction of any buildings on the site and before Stephen Whitham founded his forge. Not all of these early maps are reproduced here, only those that illustrate elements of the standing buildings are included and reference will be made to other sources as required. In addition, individual buildings are only briefly considered in this section on historic mapping which is intended to consider the broad evolution of the works from cartographic sources. Specific features and alterations to each building, especially those from the deposited building and factory plans, are examined in Section 4 of this report where each building is described in turn.

The 1847 60 inch: 1 mile OS map showed the site as undeveloped, with the Holbeck pasture extension to the Wortley, Armley and Bramley District turnpike road running on a northwest-southeast alignment through the site (**Illustration 3**). The earliest drawn maps which depict the Whitham Iron Works at Monk Bridge were both produced in 1858 by Masser (**Illustration 7**) and Davies (Fitzgerald 2004, Fig. 2). They depicted a relatively compact operation with three building groups comprising rectilinear ranges arranged parallel and at right angles to one another. Fitzgerald (2004, 4) and Kinchin-Smith (2004, 6) both discuss this evidence for the early layout and consider that the western part of the site was not expanded beyond the former turnpike branch road until Whitham had bought land to the west; however, this appears to have occurred by time the two maps were produced in 1858. It should be noted that the buildings depicted towards the west on these maps have differing alignments, although this should perhaps be considered as a cartographical error, and it is suggested that Masser's illustration is more accurate, especially if evidence from the 1855 oil painting is considered (**Illustrations 4-**

6); see Section 3.7 below. Davies' map appears to be basically a copy of the 1852 6" : 1 mile OS map with the buildings superimposed, and the former turnpike branch still shown running through the site. The turnpike was not shown on Masser' s map, or any of the later maps.

The 1866 map produced by Brierley (**Illustration 9**) is the earliest depiction of the works after it had been expanded by James Kitson. The works was by then divided into two areas, with the iron works to the north of Whitehall Road and steel works to the south. The iron works had two main buildings, the western structure correlates with building E1 and I1 and appears to represent the L-shaped tyre shop. To the east was a larger rectangular structure (the site of the rolling mill and hammer shop) with two projecting ranges to the east (interpreted as the two long puddling sheds now located beneath building H1). It is also worth noting that a narrow range ran along the whole frontage of Whitehall Road. This represented a series of adjacent structures, including the offices, warehouses, stables, cottages and time-house. A small structure, by comparison to the other buildings, was located parallel with the western boundary of the site and may represent the smithy/forge building B5.

Further detail of the site layout is illustrated on the 1881-2 Great Northern Railway Session map (**Illustration 10**). This plan showed internal subdivisions within the iron works. The steam generating boilers were illustrated to the west of building E1 and the differing parts of the frontage range were more clearly shown. The internal rail network was also depicted by that date. Less than ten years later, when the c.1890 McCorkindale (**Illustration 11**) and 1893 Ordnance Survey (**Illustration 12**) maps were printed, extensive changes had occurred. McCorkindale' s map is undated, but clearly pre-dates the 1893 OS (which was surveyed in 1888-1890), with less development shown at the site on the earlier map.

The 1893 1:500 OS map showed the site in the greatest detail (**Illustration 13**). The western end of the frontage range had been rebuilt and extensions added to building groups E, I and G. Between McCorkindale' s map and the OS, there was an extension to the south puddling shed in the iron works and new furnaces, or boilers were appended to the north shed. The tyre shop to the west had also been enlarged and the layout of the gas producers in the northwest corner was clearly depicted. There were two new structures at either end of the central axis of the iron works, the one to the south in the vicinity of

building F. The north end of the smithy/forge (building B5) had been extended. It is also interesting to note that the internal rail network was by then linked to the Steel side, via a subway at the east end of Whitehall Road and a central north-south line that crossed the road itself. A group of structures (probably including building group J) had also appeared in the northeast corner adjacent to the Leeds and Liverpool Canal.

The layout of the Steel Works to the south is also depicted in **Illustrations 11-12**. This showed the Steel side being dominated by two large rectangular sheds in the northern part of the plot, interpreted as the site of the steel foundry (east) and hammer shop (west), with a smaller range against Globe Road to the southeast, which probably housed the slitting press. In addition to this there were three structures along Whitehall Road and a narrow building on an angled orientation in the northwest corner that may represent the gas producers for the steel furnaces. Apart from the internal railway infrastructure, both fixed and travelling cranes were depicted (**Illustration 12**).

The 1908 OS (**Illustration 15**) showed much the same layout in the northern part of the site as in 1893. The steelworks to the south of Whitehall Road had been expanded between 1893 and 1908, with existing structures being enlarged and various new ancillary buildings constructed, although the majority of these are of indeterminable function.

The 1921 OS (**Illustration 16**) and 1932 OS (**Illustration 19**) closely correlate with the deposited building plans. They confirm that the rebuilding of the northern part of building I was undertaken when a new tyre rolling plant was created c.1911-12. By 1932 the gas producers were covered over, in the form of a large steel clad shed with open sides at ground level, as shown in an aerial photograph from c.1921 (Fitzgerald 2004, Fig. 34). This may correspond with the replacement of the Siemens gas producers with Mond/Dowson producers, which appear to be depicted on a 1923 plan of the factory (Fitzgerald 2004, 16; **Illustration ***). This photograph provides the earliest aerial view of the works and illustrates the larger size of the 1911 tyre rolling plant (building I) and steelworks sheds when compared with the lower rolling mill (building G), puddling sheds (below building H) and original tyre shop (building E/I). The picture and maps both indicate that the site was densely packed with a variety of buildings, chimneys and infrastructure features.

Following the closure of the Monk Bridge Iron and Steel Works in 1949 and

the purchase of the site in 1951 by Doncasters, the more recent OS maps from 1953 (**Illustration 20**) and 1963 (**Illustration 22**) confirm that a number of the redundant earlier buildings, such as the puddling sheds or gas producers, were demolished. New workshops such as those detailed on a factory plan dated to 1957-1964 (**Illustration 21**) and those such as buildings D or H were built throughout the 1960-70s to accommodate the changing needs of the Doncaster production process, which included reconfiguring the internal arrangements of the retained structures from the earlier works.

3.5 Site Layout and Manufacturing Processes

In order to understand the historic working practices of the Monk Bridge Iron and Steel Works the site should be considered in terms of production output, either iron or steel. The division of the works by Whitehall Road effectively subdivides the processes, with iron manufactured to the north and steel to the south. The two sites, whilst part of the same works, appear to have operated autonomously.

Unfortunately, the actual manufacturing processes undertaken on the site during the latter part of the 19th century are poorly represented by the structural remains recorded during this phase of survey. Therefore the following breakdown of stages of manufacture within the two sides of the works is largely derived from an analysis of the historical sources and historic mapping. It should be regarded as a high level overview and future results from the archaeological excavations on the site will no doubt refine our understanding of the former wrought-iron and steel production and enable a series of plans to be created that illustrate the changing nature of the manufacturing process.

The manufacture of 19th-century wrought-iron

Stage *Raw materials*

1: **Coal** was imported to the site via excellent connections to the Great Northern, Midland and North Eastern Railway networks and the Leeds to Liverpool Canal. **Iron ore** would have been smelted in the firm's blast furnaces on York Road to form **cast-iron** and transferred to the Monk Bridge works as **pig iron** (building A2 was an ore store in 1881 [possibly not for iron ore – RKS]).

Stage *Wrought-iron manufacture - refining*

2: The pig iron was broken up and the metal heated with coke in **refining furnaces** (located on the **west [RKS says northeast]** side of works) then tapped to form large slabs of metal c.30cwt in weight.

The refined iron was then broken into pieces and transported to the **puddling furnaces** (building G1.1 and beneath H1 on east side of works). Here the metal was refined and formed into a coagulated mass, or bloom. The metal was then removed and worked by adjacent **steam hammers** at the west end of the puddling furnaces (building G1.1) to compress the metal.

Stage *Wrought-iron manufacture – quality control, rolling and smithing*

3: The metal slabs of puddle iron were taken to smaller steam hammers and broken up again. The metal was then **tested** and subdivided into three qualities. The sorted grades were then transferred to the Siemens gas furnaces for **re-melting** (the majority of these appear to have been located in building E1, I1, and beneath I2.1, I2.2 and I3.2). The metal was tapped from the furnaces and then welded again into slabs under a steam hammer (located in building E1, I1, and beneath I2.1, I2.2 and I3.2). The metal was then formed into a variety of forms, although building E appears to have been directly associated with the manufacture of wrought-iron tyres.

Another use for the wrought-iron was as bar, rails, or boilers plates. This would require the use of a **mill**, with rollers for producing either **flat plates** or **bars** or various sizes (building G1 and G1.3 demark the former site of the plate mill). The rolled completed wrought-iron was then **stockpiled** for sale, or further refined and/or forged for the manufacture of specialised products, including axles, cranks and tyres. The latter would be undertaken in the **tyre mills** (**buildings E1 and I**).

The high grade wrought-iron was also formed into wagon and carriage axles, being heated and forged in the **smithing** shop at the west side of the site (building B5), with fitting, tooling and pattern

shops (buildings B3 and B4) close by for the manufacture and repair of the tools and appliances required in the works.

Stage *Ancillary processes and operations*

4: Motive **power** for the various engines and hammers was **steam**, produced via banks of boilers (beneath building D1); waste steam was recycled in **Berryman** super-heaters for the boiler water or **Greens** economisers.

Gas to power the Siemens furnaces was produced in 20 Siemens gas producers located in northwest of site adjacent to the viaduct.

The **offices** and **time-house** (buildings B1 and A4) to control and oversee operations were located along Whitehall Road.

A **hydraulic power station**, to power the cranes, was reportedly located in the northern part of the works at the end of the 19th century. Its location is not known.

The manufacture of 19th-century cast-steel

Stage *Acquisition of raw materials*

1: **Iron Ore** was imported from Spain and transferred to the steelworks to the south of Whitehall Road, along with any available scrap metal.

Low grade **coal** was imported to the site and a batch of **Siemens gas producers** adjacent to Midland Railway skirting the southwest edge of the site converted the coal to gas.

Stage *The Siemens-Martin Process*

2: The ore was heated then in batches of 10 tons in a large Siemens-Martin type open hearth furnace, powered by coal gas. A large shed in the eastern part of the steel works formed the melting shop and steel foundry. Here the molten metal was cast into moulds and unwanted slag removed.

Stage *Breaking and Machining*

3: Located in the southeast corner of the steel works was a building

that ran along Globe Road. This contained a powerful hydraulic ingot breaker which sliced up the steel ingots from the steel foundry into various weights for the different sizes of tyre and axel.

An adjacent and larger building to the west was referred to as the machine shop/fettling shop. Here the cast ingots were cleaned and turned to produce locomotive axels.

Stage *The Steel Forge*

4: Dominating the western half of the steelworks was a large rectangular shed used as a steel forge/hammer shop. In this building the cut segments of sliced ingot were re-heated and hammered into a circular form. Then a hole was punched in the centre. They were heated for a second time and worked on an anvil to required shape, then heated again to be rolled and finished.

Stage *Ancillary processes and operations*

5: Motive **power** for the various engines and hammers was **steam** produced via banks of boilers (located along Whitehall Road).

The **offices** and **testing-house** were located along the Whitehall Road frontage, opposite the main offices on the Iron Side.

3.6 Historical Timeline

Date	Event
1835	James Kitson moves to the Hunslet area to start producing railway materials.
1851	Stephen Whitham establishes a forge on the site in order to supply the local demand for high quality iron.
1854	The Monk Bridge Iron Works purchased by James Kitson for the sum of £21,500. Two additional plots of land are purchased further to the west.
1858	By this date the works had expanded to cover the full extent of the land under Kitson's ownership to the north of Whitehall Road (Iron Side). High grade wrought iron was being manufactured for steam engine crank axels, coupling and piston rods and by the 1860s tyres for locomotives were being produced.
1864	Further land was purchased to the south of Whitehall Road for the construction of a steelworks (Steel Side) to meet demand for high quality steel. Two large buildings erected (steel works and steel billet and tyre mill).
1884	Siemens Martin open hearth steelmaking first employed at Monk Bridge.
1885	Cast steel was being produced, primarily for cast-steel wheel centres.
1886	The Monk Bridge Iron and Steel Company was converted into a private limited company. Works comprised of: three rolling mill beam engines of 1300hp; two engines of 150hp; 30 smaller engines of 4-30hp; 30 boilers with output of c.1000hp; 14 steam hammers 6-15cwt size; and 20 Siemens gas producers.
1887	The workforce totalled 700 staff.
1890	A huge hydraulic forging press was installed with 1200 tonnes capacity.
1891	The offices were expanded in size.
1900	The works continued to develop and included: four rolling mill

engines, three of 1000hp and one of 60hp; 30 engines of 4-30hp; 30 boilers with output of c.1500hp; 14 steam hammers 6-15cwt size; and Siemens gas producers.

- 1911** Sir James Kitson died and the company was converted into a Public Limited liability Company.
- 1911** Plans for a new tyre rolling plant on the Iron Side were approved and the building had three travelling cranes and a large gas-heated furnace. The Steel Side was also expanded.
- 1914** The works was taken under government control for the duration of the First World War. [remove?]
- 1940** The works was taken under government control during the Second World War.
- 1949** The Monk Bridge Iron and Steel Works was closed and the company wound up.
- 1951** The site was purchased by Doncasters of Sheffield and rapidly became an important centre for the production of forged turbine blades.
- 1960s** Existing buildings were redeveloped and new workshops built.
- 2005** The Doncasters Monk Bridge site was closed and production transferred to sites in Sheffield and Wales.

3.7 1855 Painting of Monk Bridge Iron and Steel Works

A painting presented to Stephen Whitham on the occasion of the sale of the Monk Bridge Forge to James Kitson in 1855 was examined by ARCUS to provide additional historical evidence for the former appearance of the Works.

It was photographed in October 2006 in the company boardroom at the Head Office of Doncasters in Melbourne, Derbyshire. The picture is heavily discoloured, and mounted behind thick glass. It is approximately A1 in size, with a heavy wooden frame. Difficulties encountered during photography due to the size and the reflective nature of the glass resulted in the painting being recorded in a series of views, both detailed and general. These are reproduced as **Illustrations 4-6**.

The painting has two pages of type on the reverse; a transcript is as follows with undecipherable words being represented with a dash; thus ' _ ' :

The Monk Bridge Iron Works

Presentation to Stephen Whitham Esq

On New Year' s Day, Stephen Whitham Esq, Croft House Burley was presented a painting of the Monk Bridge Iron Works, Leeds, painted by Mr Widdas Of Little Lo_ _en as a token of esteem and regard by his late workmen. They knew Mr Whitham had a dislike to any ostentiousnes, whilst shot, sho_ _ a dozen of the foreman took the painting and presented it to him at Croft House.

Mr Whitham being deeply affected by such a token of regard from his late devoted workmen could not sufficiently express what he intended, _ _ _ _ it the arrangement of the whole of the workmen, about _ _ _ , should have _ _ _ _ _ at the expense at Mr.Bent_ _ _ ' s Cordains_ A_m_ Key Wordley he took occasion to send Mr. Samuel Whitham, his son, to read a letter on his behalf. After Dinner was served and the cloth withdrawn, Mr James Kitson was called to the chair. Mr George Auty gave an explanation to the workmen (all of whom were contributors) of how the presentation took place, and then recited a few verses of poetry composed for the occasion, in honour of their entertainer.

Mr Samuel Whitham on behalf of his father, read the following reply:

"I accept your very handsome present, a painting of the Monk Bridge Iron Works, for which please receive my best thanks. It is to me of great value because it is purchased by the affection of the workpeople in such a very liberal way. I was always much pleased when I had the _ _ _ _ opinion of the workmen, but this very generous gift is really more than I had any right to expect: therefore it will be all the more pleasing to me at all times. It will always be a great pleasure to me to see the workpeople proper, and I am sure you will if you follow the advice I always recommended; that is to be steady, _ _ _ _ _ , honest and industrious, and you will command respect wherever you go, and let it be said that the Monk Bridge Iron Works has the best and the most steady men in England. I hope you will find the Messers, Kitson good masters. I can say in confidence_ _ _ _ are all that I can desire as successors, and if you will make them our friends, I feel certain you

will have a deal to be thankful for.

----- *I have given business* -----
----- *but one or two will suffice* -----
----- *will all agree with* -----
----- *and* -----
----- *and* -----

----- *a Happy New Year."*

Stephen Whitham

*The evening was ----- messers Charles Auly and
Joseph Montain J and R. Kitson and others, and several toasts were
drunk. ----- throughout the evening Mr
Whitham handed over £8 for the artist Mr Widdas in addition to the
sum paid him for his excellent and faithful work of art.*

Leeds Mercury Supplement

16th January 1855

The picture itself depicts the works only a few years after its initial construction, before any of the extensions and additions built by the Kitsons and their successors. It appears to faithfully represent the former iron bridge over the River Aire and the style of dress of the characters all indicate that a mid-19th century date is accurate. The painting clearly depicts the setting of the ironworks with the metal framed bridge over the River Aire to the south, the River Aire viaduct to the north and the Leeds and Liverpool Canal to the east (foreground). The land to the south of Whitehall Road had yet to be developed at the time of painting (**Illustration 4**).

The painting clearly demonstrates that there was a direct physical link between the ironworks and the canal. A pair of large loading doors were depicted within the east boundary wall (**Illustration 6**) and canal barges were depicted unloading coal and loading iron bars or plates.

The frontage range of brick buildings overlooking Whitehall Road (**Illustration 4**) appears to correlate with the 1858 map (**Illustration 7**). The rolling mill (Building G), running left to right, dominated the central part of the site. It had a brick end gable, just visible, pierced by arched openings and a high oculus

vent in a raised gable, as well as an extensive slate roof with a continuous clearstory ridge vent (**Illustration 4**). It is also interesting to note that there was an open-ended curved roof linking Building G with the frontage range. The roof was supported by a metal truss of a similar design to those found in Buildings G1 and B5. Just visible beyond this building was a long, narrow, two-storey brick range, which appears to represent an early north-south range on the site of the later Building E. This building was shown on Masser's and Davies' maps of 1858, but had been demolished by 1861, when Building E was constructed (**Illustration 8**).

The northern part of the painting is dominated by two ranges of open sided puddling sheds (**Illustration 5**); beneath the modern building H1. These both had brick gables with large arched openings, oculus vents and a continuous clearstory ridge vent, similar to those shown on the rolling mill, and also found on Buildings, E, G and I1. There was a row of three large circular chimneys between the puddling sheds and smaller ancillary chimneys, square in plan, which were located along the outer edges of each range. Through the gable-end arches of the puddling shed, figures were depicted working at the furnaces (**Illustration 6**). The ground between the puddling sheds and the railway viaduct is undulating and black, and may have been a area for dumping spent fuel, and also as a storage area for coal delivered by canal barge from local collieries.

The painting has proved a fascinating insight into the appearance of the early years of the ironworks and has confirmed aspects of the overall design and appearance of both the puddling sheds and rolling mill. It showed the long, two-storey range which was depicted on the 1858 maps, but had been altered or replaced by 1868. It should be noted that, whilst some features appear to be accurate representations, an air of caution should be maintained in accepting the painting to be 100% accurate, as artistic licence may be a limiting factor. Some features may have been exaggerated or rearranged to present the more impressive details of the site in their best light.

4 DESCRIPTION OF THE STANDING BUILDINGS

4.1 Introduction

Each of the standing buildings at Doncaster Monk Bridge site (former Monk

Bridge Iron and Steel Works) to the north of the Whitehall Road is discussed in turn below. External and internal characteristics are considered, although those where detailed recording has been undertaken are examined in greater depth. The descriptions are derived from site survey, analysis of historical mapping and an assessment of evidence presented within previous surveys (Kinchin-Smith 2004 and Fitzgerald 2004).

At the time of survey the site had been decommissioned with plant removed and discarded machinery dotted throughout the buildings. For this reason, and the emphasis within the recording specification to target detailed survey upon the fragmentary remains of the historic structures (**Appendix 1**), less attention is placed upon buildings from the post-war period (1950 to 2000), although a detailed description of the late 20th-century operations has previously been reported upon by Kinchin-Smith (2004).

4.2 Site Orientation

The site is orientated roughly west-south-west – east-north-east. As with previous studies, a 'site north' is used throughout this report. For the purposes of this report, the southern boundary to the site demarked by Whitehall Road is orientated west-east, whilst the eastern edge is defined by the Leeds and Liverpool Canal, orientated north-south (**Illustration 2**). The layout of the majority of the buildings conform to the same alignment as these boundaries (building groups A-I), with only a few structures along the angled western and northeast boundaries being orientated on a roughly northwest-southeast alignment (building B5, J1). The railway viaduct along the northern boundary is also at an angle to the main orientation of the site, on a northeast-southwest alignment. A number of rooms are contained within the arches of the viaduct (building group K).

For the purposes of this report, the ground floor of each building is generally at ground level. In case of the buildings fronting onto Whitehall Road, the ground floor is that which is at pavement level.

4.3 Building Descriptions

4.3.1 Building A1

Introduction: Building A1 (**Illustrations 2 and ***) formed the eastern part of a long linear range that fronted Whitehall Road (**Plate 1**). It was adjacent to the site boundary (**Plate 7**), demarked by the Leeds to Liverpool Canal (**Plate 6**). It had a rectangular footprint and measured 6m x 7m (19.7ft x 22.9ft). The building had two levels. For this report, the single-storey former pedestrian access from Whitehall Road (**Plate 8**) is regarded as the ground floor. To the rear the building was of two storeys, with the lower floor being an exposed basement level. The basement formed a subway for the internal railway network leading under Whitehall Road to the steelworks (**Plate 9**). The subway was blocked at the time of the survey.

Historical Evolution: The earliest available historical mapping (**Illustrations 6-8**) made it difficult to be certain exactly when the building was constructed. There appears to have been an earlier structure on the site, as depicted on a painting of the works in 1855 (**Illustration 4a**). This showed a brick-built structure of a similar height to the existing building, the gable end facing the artist. The gable does not appear to be the same as that on the building as surveyed, as the former was cut back from the street at the eastern end to accommodate a steps down to the canal towpath. The overall size and height of building A1 appears to be broadly similar to that shown in 1855.

The subterranean railway line was first depicted cartographically on the 1893 OS map (**Illustration 9**), although the subway was shown as a dashed line on a deposited plan for a nearby culvert in 1878 (**Illustrations 29-30**). In deposited plans of Building A2 from 1880, an elevation drawing partially depicted a brick segmental arch forming the north side of the subway (**Illustration 27**), although no existing evidence for this remained at the time of survey (**Plate 9**). The rear of the building appears to have been heavily modified, possibly in association with the widening of the railway arch, which appears from factory plans to have been undertaken in the 1930s to 1940s (**Illustrations * and ***).

Factory plans from the 1940s (**Illustration 16**) and 1957-64 (**Illustration 21**) indicate that the ground floor had undergone a change of use, and it was described as a personnel and labour office. As part of this, new windows and doors were added and the internal arrangement was altered. Some of these

alterations may have been done at the same time as the widening of the railway running under the building. The 2002 factory plan labelled the ground floor as 'Training' , and some exercise equipment was in the rooms at the time of the survey.

Exterior Description: Building A1 was brick-built with a pitched slate roof. There were dentillated eaves course on the north (**Plate 9**) and south (**Plate 8**) elevations, a design detail associated with buildings dating from the earliest phase of the forge. The east gable was plain and unadorned (**Plate 7**). The pitched slate roof, running east-west, had no evidence of former chimney stacks.

The south elevation fronting Whitehall Road was divided into three bays (**Plate 8**), the eastern two contained rectangular windows (blocked) under sandstone lintels, with chamfered stone sills. The western bay contained an inserted, full-depth double opening (blocked) under an inserted concrete lintel (all blockings were modern brick). Behind this is a mid-20th-century timber-framed glazed panel containing a door and windows (**Plate 11**). The east elevation contained a single window opening (blocked), with a stone lintel and bull-nosed blue brick sill (**Plate 7**).

The north elevation was two storeys in height due to the subway below (**Plate 9**). The upper level (ground floor) had three inserted window bays with bull-nose blue brick sills and one single door bay, all under concrete lintels. The eastern window bay was formerly a door, possibly wider than the existing door, with brick blocking visible below the window sill. It was shown as a door on factory plan of c.1957-64 (**Illustration 21**). The window and doorway alterations appear to date from the early period following the takeover of the works by Doncasters (1950s). An exterior steel walkway was added during the Doncasters period (1951-2005) to provide additional access at first floor level above the north entrance to the subway, which replaced an earlier stair depicted on a 1940s plan of the site (**Illustration 16**).

The former railway subway, A1B1, was blocked at the time of survey (**Plate 9**) and not examined in detail. On the north elevation it consisted of a full-width void between 20th-century brick piers, spanned by a reinforced concrete beam. To the south of the building, where it ran beneath the road, a riveted composite girder was used to span the void.

Interior Description: The interior of this building at ground floor level was heavily modernised in the later 20th century, with the insertion of suspended ceilings and replacement south windows. The interior space had been subdivided into two rooms, by the addition of internal partitions. Rooms A1G2 comprised an entrance passage with a glazed door and windows on the south (road side), which had been bricked-up on the exterior (**Plate 11**). The adjacent room A1G1 consisted of an office.

Discussion: The brickwork of the eaves had an aged appearance, with handmade bricks, which suggest that fragments of the Phase 1 (pre-1875) building may have survived within the eaves and roof. The building had been heavily modified, with most elements apparently almost entirely rebuilt. The building as shown on the 1855 painting (**Illustration 4a**) had a different layout to the one which survived at the time of survey. The window and door details of the northern elevation shown on building plans from 1880 also do not correspond with the latest pattern.

The subway was not built until after the land to the south of Whitehall Road was purchased by Kitson in 1864, and may have necessitated the complete rebuilding of the structure. The roof of the tunnel consists of riveted girders, although it is not clear if this is the original roof or a later alteration. A wide, arched opening for the subway was shown in the northern elevation on the 1880 plans. Later factory plans suggest that the subway was widened in the first half of the 20th century (Phase 4), which may be when the composite riveted girder roof of the tunnel was constructed. This is likely to have entailed major disturbance to the existing building, and may have coincided with the rebuilding of the northern and southern elevations, as the deep concrete lintels, replacing the earlier arched lintels, are consistent with this date. The blue brick sills are consistent with the Doncasters house style (1950s – Phase 5), which post-dates the probable subway widening, suggesting there may have been some later alterations. Although much of the structure appears to have been altered or rebuilt, it is possible that elements of the roof and eaves were retained or reused in the modified building.

In the 1940s or 1950s, the ground floor was modified into office space, with the insertion of the glazed door to Whitehall Road in A1G2 apparently dating to this phase. The 2002 factory plan indicates that its last usage was as a 'training room' , apparently a kind of ad-hoc gym, with exercise equipment

left in the room. The brickwork blocking of the glazed door and windows on the south elevation may have coincided with this use. The entrance was subsequently via an external stair from the works yard to the rear.

4.3.2 Buildings A2 and A2.1

Introduction: Buildings A2 and A2.1 (**Illustrations 2 and ***) were located towards the eastern end of the Whitehall Road frontage range (**Plate 1**), between building A1 and A3. They were two storeys in height, although due to the change of level, the building's south (Whitehall Road) elevation was single-storey (**Plate 12**), whilst the northern elevation was two-storey, with a lower basement level below the 'ground floor' (**Plate 2**). The buildings had an L-shaped footprint, measuring 5.5m x 12.5m (18ft x 41ft), and a flat roof. The structures were clearly multi-phased, although in terms of overall appearance they appear to be of mid-20th century date.

Historical Evolution: The extant building at time of survey had been extensively altered, although a structure was depicted on the site from 1858 (**Illustration 6**), clearly part of the original Whitham complex. The building appears to have changed its shape, having been extended to the north by 1866 (**Illustration 7**). This addition was not shown on any other maps, which may indicate a mapping error on Brierley's map, rather than an accurate depiction of an extension. It was not shown on the 1878 (**Illustration 23**) or 1880 (**Illustration 25-28**) deposited plans which indicated that the building was subdivided into two rooms at basement level and a single room above.

The deposited plans of 1880 were for water closets, to be inserted into the eastern end of the basement (A2B1). The northern elevation had a large, segmental brick arched opening directly onto the yard, with the plans proposing a partition along the centre of the previously larger room (**Illustration 26-27**). The adjacent room to the west (A2B2) was wider, and in use as an ore store. It had a double-width opening with a segmental brick arch, and a window with a slightly curved lintel in the north elevation. The culvert beneath Whitehall Road, proposed in the 1878 deposited plan, originated from this basement room, which was described as being for 'ground ore' (**Illustration 23**). The type of ore is not stated. As descriptions of the works suggest that pig iron was brought to the site for ironworking, the room may have been a store for ores used in the steel-making process. The

building' s proximity to the canal and the internal railway would have made it a useful storage point in the transition between delivery and distribution to the relevant part of the steelworks.

The 1880 plans showed the ground floor as a narrow room with three windows in the northern elevation (**Illustrations 27-28**). The windows had slightly curving brick lintels. The section through the room did not indicate any windows on the southern (road side) elevation, possibly for security reasons. This room was described as a pattern store on the plans.

The north wall had been extended northwards by 1932 (**Illustration 15**), and by the 1940s (**Illustrations 17**), the former ore store (A2B2) and water closet (A2B1) had been converted into a substation, with a security office to the north (A2.1B1-A2.1B3). Further internal alterations to the northern part of the building took place during the 1960s (**Illustrations 21-22**). The c.1957-64 factory plan showed the upper (ground) floor level as 'transformer house, within A2G1, which was subdivided into three partitioned compartments (**Illustration 34**). This was surrounded by an L-shaped corridor (A2G3), with a small 'conference room' to the north (A2.1 G1-G2, shown as a single room). Fenestration was clearly added to the southern elevation at some point in the 20th century, although only the 2002 factory plan showed these details (**Illustration ***).

Exterior Description: The buildings were brick-built with a flat roof. The south elevation, fronting Whitehall Road, had five window bays, with modern concrete sills and lintels, the latter similar to those on the north elevation of building A1 (**Plate 12**). The brickwork could be divided into three phases of construction. The lower two to three courses were remnants of the primary phase (mid-19th century), whilst the main body of the wall and windows appeared to be early to mid-20th century (Phase 4). The upper courses above the window heads and flat roof were c.1950s-60s (Phase 5) in date.

The north elevation is consistent in design with Doncasters' 1950s-1960s house style, with a flat roof, bull-nosed blue brick sills and shallow, recessed concrete lintels supporting a brick soldier course (**Plates 13, 14**). Whilst apparently consistent in terms of detailing, the elevation could be divided into two phases of construction. The lower storey, with the exception of the 1950s sills and lintels, was constructed as a latrine block at some point prior to 1923 (Phase 3, **Illustration ***). The upper portion is of 1950s date (Phase 5). The

north elevation could be divided into two sections. The projecting eastern section (A2.1; **Plate 13**) had three window bays at ground and first floors, with the windows on the lower storey having been blocked up from behind.

The western part of the north elevation was set back c.3m (**Plate 14**) from the eastern section, where the building is only one room deep. Centrally located is a projecting brick lift tower; the upper part of the tower had been rebuilt when the flat roof was added in Phase 5. On either side of this tower were access doorways, the western leading up to the first floor (A2G3), whilst the eastern provides access to the basement (A2B2). At the upper level (ground floor) there were windows above each doorway, with soldier brick lintels. The window to the east lighting an inserted staircase had a wooden base panel without a sill and may have once been totally open.

The eastern elevation had an inserted single doorway in the northeast corner of the building at basement level, adjacent to the subway beneath building A1 (**Plate 13**). The doorway led into a small storeroom (A2.1 B3). Above this doorway at ground floor level was a broad, flat-headed modern window with a shallow, recessed concrete lintel and a rounded bull-nose brick sill, but no soldier course. The west-facing elevation of building A2 was plain and featureless, apart from a simple glazed wooden porch at the top of the stair flight down to the basement (**Plate 4**).

Interior Description: The internal arrangement (**Illustration 34**) at basement level comprised a single large room, A2B2 (**Plate 22**) with a small room, A2B1 (**Plate 21**) to the east along the southern edge of the building. There was a smaller complex of rooms to the north, A2.1B2, accessed from an L-shaped room A2.1B1 (**Plates 23-25**). Access to the basement is in the northwest corner via a stair leading to the external yard, or up an inserted concrete dog-leg staircase (**Plate 26**) leading to the first floor room A2G3.

Similar to building A1 to the east, A2 had been extensively altered, with the insertion of suspended ceilings, replaced windows and internal partitions. The first floor could be divided into a large room, A2G1, with four windows along the south of the building (**Plates 15,18**). This was separated from the other rooms by a modern glazed 'L-shaped' corridor, A2G3, providing access into A1G2, the service lift (**Plate 20**) and rooms A2.1G1 and A2.1G2 to the north (**Plates 16-17**). None of these rooms have any features of note.

Discussion: At basement level fragments of walling from the primary single room deep range survived as can be seen in the brick footings on the external south elevation (**Plate 12**). The deposited plans (**Illustrations 25-28**) indicate that welfare provision in the form of flushing water closets for the 700 strong workforce was required, most likely as a result of increasing pressure from factory inspectors charged with implementation of the various factory acts in the 19th century; although the provision was clearly however woefully inadequate. The proximity of the basement level ore store to both the canal entrance (**Illustration 3a**) and the long sheds housing the puddling furnaces immediately to the north (beneath building H) is interesting and gives an insight into the operational use of this corner of the ironworks. The use of the upper level of building A2 as a pattern store is also of note, indicating that wooden moulds and patterns were in demand and that casting of metal was still occurring on the site in the 1880s.

The extensive alterations in the first half of the 20th century involving the expansion to the north and the introduction of concrete floors, goods hoist and new staircases for an electricity substation and additional uses during the Doncasters period (1951-2005) demonstrate the amount of reuse and change that has occurred throughout many parts of the site.

4.3.3 Buildings A3 and A3.1

Introduction: Buildings A3 and A3.1 (**Plates 27, 28**) were located within the eastern half of the frontage buildings along Whitehall Road (**Illustration 2**), between A2 and A4. They were single storey with a double height interior. Access was from the north (**Plate 30**). Building A3 had a rectangular footprint and was one room deep measuring 6m x 23m (19.6ft x 75.4ft), with A3.1 a small rectangular extension to the rear (**Illustration 34**).

Historical Evolution: A structure is depicted on the site from 1858 (**Illustration 6**) probably part of the early ironworks. The historic maps illustrate minimal changes in the appearance of building A3. The eastern edge is included on the deposited plans of 1881 (**Illustration 26**) where it is labelled as 'warehouse'. This use is confirmed by an approved plan from 1906 (**Illustration 12**) which marks it as the 'iron warehouse'. However by 1940s it is labelled as being used for 'blade proofing' or offices (**Illustrations 16, 17,21**). By the 1960s various additional alterations had occurred, including

changes to A3.1 (**Illustrations 22**).

Exterior Description: Building A3 was brick built structure, with a high pitched slate covered roof. The south elevation overlooking Whitehall Road had six window bays, with a raised gable in the fourth bay from west (**Plate 27**). There were square brickwork dentils under at eaves level and a stone string-course at the transom level of the windows. The windows had stone sills, although the lintels had been replaced in concrete. The window in the gabled bay (**Plate 27**) had a stone transom and segmental brick head. The core fabric of the building dated to the primary phase of construction (**Illustration 34**).

The north elevation was rendered brick (**Plate 30**) with a dentiled eaves course. There were five external bay divisions, with two narrow blocked doors with inserted high level windows to the east. The remaining three windows had stone sills, although the central one had been partially truncated, by the insertion of a double access door. Above the fifth window from the east was a gable similar to the one on the south elevation with a rounded headed window and stone sill (**Plate 29**).

Built against the western end was a single-storey, pent-roofed brick outshut used as a store (**plate 29**). It had a slate roof and measured 2m x 6m (6.5ft x 19.68ft). This structure had been extensively altered in phase 5, although appears to have originated in phase 3.

Interior Description: The building was one room deep and subdivided into three interconnected rooms of unequal size and one and a half storeys in height. The east room A3G1 was the smallest (**Plate 34**). The central room A3G3 (**Plates 32, 33**) was the largest and had inserted double doors in the north elevation. The western room (**Plate 31**) had an inserted suspended ceiling and had direct access into Building A4 to the west, although this was a later doorway.

Discussion: Building A3 appears to have been built as an iron warehouse, located directly opposite the former rolling mill. It would have been a single large space open to the rafters, although has been subdivided in the 20th century to meet the changing needs of the works.

4.3.4 Buildings A4, A4.1 and A4.2

Introduction: Building A4 (**Plate 1**) was a substantial two and three storey

range fronting Whitehall Road (**Illustration 2**) located immediately west of the main entrance. It had a rectangular footprint, measuring 8m x 38m (26.2ft x 124.6ft), with two small projections to the north and an over-sailing first floor corridor (**Plates 41-43**).

Historical Evolution: The earliest map by Masser dated 1858 (**Illustration 6**) depicts a building on the site of building A4, however it is not until Brierley produces his map in 1866 (**Illustration 7**) that the single room deep range of buildings fronting Whitehall Road is clearly depicted, of which A4 would be located to the right of centre. The next available map is from 1881-2 (**Illustration 8**) which subdivides the frontage range into individual buildings units and further detail of projecting northern sections are included on the 1888-90 OS map (**Illustration 9**).

Soon after this map was printed a set of drawings were produced by Chorley and Cannon Architects of Leeds which detail enlarging the offices by adding another two storeys (**Illustrations 32, 33**) and extensive remodelling of the interior spaces (**Illustrations 30, 31**). The ground floor retained its function as a counting house, forge office, although the entrance door on Whitehall Road was altered and it may have been at this time that the staircase was retiled. On the first floor a suite of new offices for corresponding clerks, Sir James Kitson, the Directors, Mr Jeffreys, Forge Managers and Engineers. These rooms were connected by an overhanging corridor along the north elevation. A smaller second storey was built to house a dressing room, lavatory and book store. The plans are very detailed and provide additional evidence for the prosperity of the works in the latter part of the 19th century. These changes appear to have been implemented by 1906, where an approved plan includes alterations at ground floor level (**Illustration 12**).

Later plans from the 1930s, 1940s and 1950s (**Illustrations 16, 17, 21**) all illustrate that the overall plan of building A4, A4.1 and A4.2 broadly stayed the same, some internal alterations did occur functions of rooms changed.

Exterior Description: Building A4 was built of brick with a pitched slated roof and had two projecting outshuts, A4.1 and A4.2, to the rear (north elevation). The south elevation fronting Whitehall Road (**Plates 36-39**) had thirteen window bay divisions at ground floor level, with gables over bays (from the west) 1-2, 8-9 and 13. The ground floor windows (phase 1) all had projecting sawn stone sills and segmental brick heads. The spacing of the windows

varied. Those forming Bays 1-8 were fairly equidistant and were at a constant level, the sills of which were connected with an ashlar string band (**Plate 38**). The ground floor windows in the east part of the elevation, bays 9-10 (**Plate 37**) and bays 11-13 (**Plate 36**) stepped up in height as the ground level rises and the spacing increased, which corresponded with historic internal arrangements. For example, located between windows in bays 8 and 9 there had originally been a safe built against the south wall in room A4G3 (see **Illustration 30**), although no evidence for this survived (**Plate 55**). It should also be noted that windows in bays 9-10 (**plate 37**) appeared to be later insertions (possibly phase 3) with ragged jambs and they were not illustrated on the 1890 alteration plans (**Illustrations 30, 32**).

At first floor level there was an ashlar string course which runs the length of the building. This was cut by the main south entrance door (**Plates 35**) which formed part of the 1890s alterations (see **Illustration 32**) and was totally refashioned at the same time as the construction of the upper floors. It was set beneath a terracotta round-headed arch, complete with hood mould and a continuous roll moulding running down the jambs.

The first floor level of the south elevation (**Plates 36-39**) had been totally rebuilt in good quality machine pressed brick with terracotta window surrounds with flat arched terracotta joggled segmental heads and moulded jambs (**Illustration 32**). The fenestration was arranged in groups of either three or pairs of windows of standard size, with smaller openings providing light onto the former internal staircases (**Illustration 30**), although the window above ground floor bay 10 had been enlarged (**Plate 37**). The eastern half of A4 was two storeys in height dating to the 1890s period of rebuilding (phase 2), (**Plates 36, 37**). The windows had similar mouldings to the first floor, with either end of this part of the elevation having raised gables, with terracotta detailing, string course details and ball finials. The roof of this section had hipped ends and terracotta ridge tiles.

The west elevation (**plate 40**) overlooked the former weighbridge passageway and the wall surface was concealed with a modern concrete render. There would have originally been a ground floor window (see **Illustration 30** and **Plate 46**) and an over-sailing archway forming a link to the buildings to the west (see **Illustration 32**).

The north elevation facing the interior of the former ironworks had an

irregular bay structure (**Plates 41-44**), with the central section of elevation projecting forwards with a recessed loading bay at ground floor (**Illustration 34**). The first floor was weather-boarded and contained three hung sash windows that lit an internal connecting corridor (**Plate 42**). Much of the north elevation was altered during the 1890s as is detailed on the Chorley and Cannon elevation drawing with changes depicted in red (**Illustration 33**). It is worth noting that the northwest corner (A4.1) had a post 1950s glazed window with narrow wooden mullions and transoms (**Plate 41**), however this was originally a decorated projecting bay with narrow lights overlooking an internal staircase.

The treatment of this elevation is more functional than the one overlooking Whitehall Road, although there were still areas of decorative saw-tooth brick detailing under eaves. There are two outshuts built against this elevation, A4.1 measuring 1.6m x 4m (1.7ft x 13.1ft) (**Plate 41**) and A4.2 (**Plate 43**) measuring 2m x 6m (6.5ft x 19.6ft).

Interior Description: The interior of the building had been substantially altered, with either the removal of earlier features and fittings, or their concealment behind later partitions or suspended ceilings. The following description is therefore based upon the room layout at the time of survey in 2006.

The basement extended almost the full length of the building (**Illustration 34**) and comprised a main corridor to the north, A4 B7 (**Plate 81**), which provides access to a series of rooms to the south, A4B1-A4B8 (**Plates 82-89**). The exterior walls were of stone rubble construction with brick-built room divisions, and the basic layout of the cellars remained as that represented on the 1940s factory plan (**Illustration 16**).

The ground floor could be subdivided into an entrance hall (**Plate 47**) and access stairwell (**Plate 45**) to the west, A4G7 and A4G8, with a series of interconnecting modern (phase 6) office spaces of differing sizes towards the east, A4G45-A4G6 (**Plate 54**) and a modern works canteen, A4G3 (**Plate 55**). The entrance lobby (A4G7) and staircase (A4F2), retained a significant amount of decorative timberwork with moulded architraves and skirting; dating mainly from the 1890s alterations (see **Illustration 31**). There was a timber stilted round-headed arch to the foot of the main staircase (**Plate 45**). The stair itself appeared to have been re-treaded and the accompanying skirting had been replaced, however, the return of the stair had walls covered with decorative

polychrome ceramic tiles (mustard yellow) below a dark timber coving and timber covered ceiling (**Plates 48 and 49**). The tiles were locally manufactured at the Burmantofts tile factory in Leeds. Beneath the stair was a small waiting room, A41.G1, with a blocked window overlooking the removed entrance passage to the west (**Plate 46**).

The floor of the lobby was covered with modern ceramic floor tiles, although they overlaid an earlier tessellated floor of the building (**plates 51-53**), probably dating from the 1891 refurbishment (phase 2). It comprised large fields of plain white tesserae with a geometric border running around the base of the walls. The remainder of the first floor of the building had been heavily modernised and contained almost nothing in the way of original features. One interesting exception was the partial survival of a large walk-in safe (**Plate 91**) illustrated on the Chorley and Cannon plan (**Illustration 30**). During the early twentieth century a doorway was cut into the wall of the safe and the floor was removed to allow a stair to be constructed leading to the basement below A4 G9.

Built against the northern wall of A4 was small two-storey bay, A4.1G1, added to west end (**Illustration 34**), thus bringing it forward to line of remainder of the elevation. It is tentatively dated to phase 3, c.1916-23, although the fenestration may be later. A second outshut towards the east, A4.2, (**Illustration 34**) was a brick-built flat-roofed staircase lobby with staircase, being built between 1944-1956, although the core fabric may have dated to the phase 2 alterations (see **Illustration 30**).

The first floor broadly corresponded with the altered layout from the 1890s (see **Illustration 30**). There was a suite of offices, A4F1-A4F9 along the south side of the building, all accessed from a long corridor to the north, A4F4 (**Plate 64**). The former designations of the offices (from west to east) included, the Corresponding Clerks, A4F1 (**Plates 59-62**), Sir James Kitson, A4F5 (**Plates 65,66**), the Directors office, A4F6 (**Plate 66**), Mr Jeffreys, A4F7 (**Plates 68,69**), the Forge Manager, A4F8 (**Plate 72**) and the Engineers, A4F9 (**Plate 73**). During the archaeological survey many of the former offices were found to retain historic details (as drawn on the 1891 drawings **Illustrations 30-33**), although the rooms have been extensively modernised and the ceilings lowered. Wooden skirting's, architraves and panelled doors remained and many rooms had coved ceilings (**Plate 69**). Additional features of note

included a large wall safe in room A4F1 (the Corresponding Clerks) and a pieced ceiling ventilator in room A4F5 (**plate 71**). Vertical metal roof vents are depicted on the 1891 drawings (**Illustration 31**), although no external evidence for them was observed (**Plates 41-44**).

Orientated north-south and running beneath the floor of the north corridor A4F4 was a riveted fabricated girder (**Plate 79**). This was formerly part of the roof structure of an open shed which connected the front range of buildings to the rolling mill, building G1 to the north. It is interesting to note that the girder has been deliberately curved to accommodate the passageway, A4F4, therefore indicating that it was inserted after the upper floors were added to the building in the 1890s.

The second floor (**Illustration 34**) was reached via a narrow stone stairway between rooms A4F7 and A4F8 (**Plate 74**). This floor comprised three rooms A4S1-A4S3 was designed as a private 'dressing room' , 'library' and 'lavatory' (**Illustration 30**). Internally modern surface finishes concealed any historical details (**Plates 75-77**) apart from a deeply moulded window frame (**Plate 78**).

Discussion: Building A4 appears to have originated as a narrow frontage building, of similar appearance to building A3. Its function at this early phase is unclear, although its later use as offices close to the main entrance may have been a historical usage. The 1891 drawings do describe the ground floor as the 'forge office' and 'counting house' , although this may be from the early Kitson operations, rather than the Whitham phase.

The expansion of the offices by the established firm of Leeds architects 'Chorley & Cannon' , is clearly a sign that the iron and steel operations were a success. The new office accommodation ensured that the company maintained high standards and aided their prosperity. The use of mosaic flooring and decorative tiles were all intended to impress both competitors and clients.

4.3.5 Building B1

Introduction: Building B1 (**Illustration 2**) was a two storey brick built structure (**Plates 3,5**) located to the west of the entrance gate to the site and formed the end building of a linear range that continued up to the western boundary and railway.

Historic Evolution: Building B1 dated from the first expansion of the works, phase 1, after the site was acquired by James Kitson in 1854. Although buildings are depicted on the site of Building B1 on Messer's map of 1858 (**Illustration 6**), the building is not clearly depicted as of the same footprint to B1 until the production of Brierley's map of 1866 (**Illustration 7**) where the single room deep range is depicted as running across the entire south edge of the site. The maps clearly demonstrate that building B1 had originally been adjoined to Building A4, with a cart passage visible on the 1888 OS (**Illustration 9**). Despite the subsequent major alterations to Building A4; Building B1 remained largely unaltered except for the demolition in the late 20th century of further contemporary rooms to the east that had incorporated a time office and weigh house in addition to the cart passage between them and Building A4.

Exterior Description: The building measured 7m x 6m, although including the demolished entrance to the east it had previously measured 17m x 6m. It is built from brick with a pitched slate roof. The south elevation on Whitehall Road had three window bays that possessed rubbed brick segmental heads, and continuous stone sills that formed upper and lower string-courses (**Plate 92**). Some of the detailing employed on the building, such as the brick eaves dentilation and the rubbed brick window heads was similar to that used on the Whitehall Road elevation of the eastern range (A1-A4) (**Plate 1**).

The east elevation was rendered and painted white (**Plate 93**). It contained inserted access doors to the security office and lobby, B1G1.

The north elevation had a three light semi-circular bay window (c.1900) at the eastern end of the ground floor, with two single doorways under rubbed brick segmental heads towards the west (**Plate 94**). At first floor there was a single window above the western ground floor doorway, with a stone sill and a rubbed brick segmental head. A second (blocked) window with similar detailing was above the ground floor bay window, although it is slightly recessed from the wall alignment. There is a projecting course of brick dentils below the eaves.

Interior Description: The interior of the building had been heavily modernised and little in the way of original features survived. The basement comprised two rooms: B1B1 (**Plate 95**), and B1B2 that was accessed from cellar B2B2 to the west, although originally there was a door (now blocked) to the east (**Plate**

96).

The first floor can be subdivided into two separate rooms, B1G1, was the security office and lobby (**Plate 97**), with a second B1G2 to the west (**Plate 98**) used as a waiting room. In room B1G1 part of the original lath-and-plaster ceiling remained visible, however, the majority was obscured by an inserted suspended ceiling. In the northwest corner of room B1G2 was a stairway, B1G3, which provided external access to the northern yard and up to the first floor (**Plate 99**). It was an original feature of the building, with the south wall clad with painted timber panelling that incorporated a moulded skirting board (**Plate 100**).

The first floor rooms of the building were similarly heavily modified, with no original features evident other than the lath-and-plaster ceiling. There was a narrow corridor (B1F1/B2F1) that connected with the upper floor of Building B2 (**Plate 116**). The floor had been subdivided into modern toilets, B1F2 (**Plates 101-102**) and a former kitchen, B2F2/B1F1 (**Plate 118**).

Discussion: Building B1 represented a near unaltered remnant of the original mid-19th century office range that had ran along Whitehall Road. The southern elevation demonstrated a differing emphasis on decorum than that incorporated in the later remodelling of Building A4 to the east. In the original design the ground floor had the larger windows indicating how that floor had been intended to appear the more significant and had likely therefore contained the principle offices. The subsequent remodelling of A4 indicated the transferral of these offices to the first floor, with the first floor of Building B1 becoming the Director' s Dining Room (**Illustration 37**). Consequently it is unlikely that the functions of the rooms at time of survey were representative of their earlier usage, although we can assume they were administrative rather than industrial.

4.3.6 Building B2 and B2.1

Introduction: Building B2 was located between B1 and B3 to the west of the main entrance and fronted onto Whitehall Road (**Illustration 2**). It was two and three storeys in height, built from brick with a slate roof and measured 14.5m x 6m. Building B2.1 was a small, three-storey, brick-built, hipped-slate-roofed annexe, abutting the north side of Building B2 (**Plates 3 & 5**). The ground plan measured 4m x 3.5m.

Historic Evolution: Buildings B2 and B2.1 date to the earliest phase of development identified on site. Structures existed on the site by the production of Masser's map in 1858 (**Illustration 6**), although the boundaries of Buildings B2 and B2.1 were not depicted until the production of the 1888 OS map (**Illustration 9**). Buildings B2 and B2.1 were separated from B1 by a distinct straight vertical joint indicating that they were structurally independent, although continuing architectural style across both buildings would indicate that they had been planned in conjunction. The three storey section to the east was contemporary with the second phase of construction (c.1890), whilst the flat-roofed third storey to the west had been added after the second phase; presumably during the early 20th century.

Exterior Description: The south elevation of Building B2 fronting onto Whitehall Road had two storeys, with a flat-roofed secondary third storey to the west and a gabled three storey to the east (**Plate 103**). The six window bays have rubbed brick segmental heads, with continuous stone sills forming upper and lower string-courses. A vertical construction joint to the east indicated that this range post-dated Building B1 adjacent, although Building B3 to the west was later. There were square brickwork dentils under eaves, apart from the secondary flat-roofed third storey to the west, which had simpler segmental brick heads possibly dating to when B3 was constructed (**Plate 103**). This elevation still retained evidence of the original form of the building. The position of the entrance door could be seen (with the door openings converted to windows). Furthermore the western doorway retained its original boot scraper and the central doorway, in the three eastern bays, possessed a void where its boot scraper had been located.

The north elevation (**Plates 104-105**) of Building B2 was two storeys, with a flat-roofed secondary third storey to the west and a third storey with a gable to the east. There were six window bays of which the western two were obscured by Building B2.1. All of the primary openings had rubbed brick segmental heads, with stone sills. There were square brickwork dentils under the eaves, apart from the flat-roofed third storey to Building B2.1, which had simpler segmental brick heads.

The north elevation of Building B2.1 had two ground floor doorways with segmental brick heads and one wide modern window at first floor with a concrete lintel and sill, with a rebuilt segmental headed window at the second

floor with a stone sill (**Plate 105**). The east elevation had two ground floor doorways with segmental brick heads (blocked), although these were built within earlier window and doorway blockings, again with segmental brick heads (**Plate 105**). At second floor was a rebuilt segmental headed window with a stone sill, similar to the one on the east elevation at this level. The building possessed saw-tooth brick dentils below the eaves, indicating a construction date of c.1880-90 making it presumably contemporary with Building B3 and the upper floors of A4.

Interior Description: The interior of Building B2 had been heavily altered, although original features did survive. The basement comprised a large rectangular room, B2B1 (**Plate 124**), with a smaller partitioned store in the southeast corner, B2B2 (**Plate 125**). Access was via a flight of steps in the southeast corner of room B3G1.

The ground floor of the larger, eastern, cottage had been stripped of its original internal room divisions, with inserted beams carrying the upper walls. In their place, the building had had light partition walls inserted to create a surgery, with a waiting room, treatment room and doctor's office (B2G1-B2G3). The only historic elements surviving in these rooms were sections of plaster coving at the head of the removed walls (**Plates 107,109,111**). The western cottage was represented by rooms B2G4 and B2G5. Room B2G4 represented the scullery of the cottage; however, the toilet, washbasin, fireplace, and staircase had all been removed. Only the small toilet window and some coving on the east side of the room survived (**Plate 112**). The kitchen of the western cottage was room B2G5. This room contained no historic elements, other than the original window and the door position in the south wall (**Plate 113**).

The first floor had been reordered to form a kitchen, B2F2 that joins with B1F3 (**Plate 118**) and a large room (latterly used as a drawing office) B2F3 (**Plate 119**). There was a narrow access corridor along the north of the building B2F1 (**Plate 116**), which contained a stair (**Plate 120**) leading up to a small second floor room B2S1 (**Plates 121,122**). The western end of B2, room B2F4, was altered in 1941 to form a canteen kitchen (**Illustration 37**) which connected directly with B3F1 (**Plate 133**) and was set at a height to correlate with Building B3, thus is c.1m above the floor level in B2.

The interior of Building B2.1 had been extensively altered. It was built to

contain a half turn stair with landings around a central core (see **Illustration 37**). The ground floor, B2.1G1, (**Plates 114,115**) connected with B2G5, whilst the upper floors B2.1F1 (**Plate 117**) and B2.1S1 (**Plate 123**) were devoid of historic details.

Discussion: Based on the fragmentary remains of the primary decorative scheme employed within these buildings it may be suggested that the term cottages is somewhat misleading, particularly in the case of the larger of the two properties. This appears to have been a house of some quality, with moulded coving and deep skirting boards, presumably for a site manager, or caretaker. Relating to the first phase of development along Whitehall lane Buildings B2 and B2.1 represented planned accommodation for key site personnel. Beyond this the building were interesting in that although they post-dated Building B1 to the east they continued a design scheme, suggesting planned development of the Whitehall Road staff and administration facilities.

4.3.7 Building B3

Introduction: Building B3 was an extension to the western end of the range of buildings fronting onto Whitehall Road (**Illustration 2, & 40**) It was a two storey brick-built structure with a pitched slate roof, sandwiched between B2 and B4 (**Plates 3 & 4**).

Historic Evolution: Although structures appeared on the site of Building B3 from the first phase of development (see Masser' s 1858 map **Illustration 6**), not until the production of the Great Northern Railway map of 1882 (**Illustration 8**) did a building appear matching the plan of Building B3. Between 1854 and 1881 the plot appeared to have been part of a single room deep range along Whitehall Road (see Brierley' s map of 1866 **Illustration 7**), although it is possible that this was due to simplified survey. In survey Building B3 was observed to have been structurally distinct from both B2 to the east and B4 to the west, corroborating with map evidence to suggest it was earlier in date to Building B4, but built after the completion of Building B2.

Exterior Description: The overall appearance of the building offered a more decorative aspect to the southern (public side) elevation, which had seven window bays, with openings alternating on each storey between round-headed and segmental brick heads. The upper round-headed windows broke

the eaves line and were set in semi-circular dormers. There were stone string courses and an eaves course of saw-tooth brick dentils (**Plate 126**).

The north elevation comprised three window bays to either side of a central bay with a gable over large doorways to ground and second storeys (the upper taking-in door (**Plate 128**) has been reduced to a window). The windows had segmental brick heads and stone sills, with a saw-tooth brick dentil course below the eaves (**Plate 129**).

Interior Description: The ground floor, B3G1, was a single large workshop space (**Plate 130**), with no features of note. The first floor (**Illustration 41**) had been re-ordered and divided into a large workshop/laboratory space B3F4 (**Plate 132**), with a series of modern offices of varying size B3F1-B3F4 and B3F6 (**Plates 131,133,134,135**).

Discussion: Although design elements from Building B2, such as string courses and saw-tooth brick dentils, continued across the southern façade of Building B3, it demonstrated elaborations of the design with semi-circular dormers and round headed windows. Despite this the decorum established through the size of windows still established the ground floor as the principle level, which made it more in keeping with earlier buildings such as B1 rather than the c1900 alterations made to A4. Consequently Building B3 likely dated to early phase 2 of site development.

4.3.8 Building B4

Introduction: Building B4 (**Plates 3 & 4**) was the westernmost extension to the Whitehall Road range, comprising a large two storey brick-built building measuring 29m x 13m, with a slate roof.

Historic Evolution: Structures first appeared on the site of Building B4 on Masser's 1858 map (**Illustration 6**). The subsequent re-development of buildings within this area occurred throughout the second half of the 19th century, with Building B4 first appearing on the Ordnance Survey map of 1888 (**Illustration 9**). An undated plan (**Illustration 39**) entitled 'machine shop on iron side', depicted the building as a double height workshop/hall, with a travelling crane below the first floor windows. The detailed measurements on this drawing indicate that this was likely a proposal drawing. The architectural style employed in its construction was contingent of the progressively refined manner applied throughout the buildings fronting Whitehall Road, and

corroborated a late 19th-century date for construction.

Exterior Description: The south elevation of Building B4 was the principle façade and comprised eight window bays, with openings with segmental brick heads. It had stone string courses and sills (**Plates 136-138**), with saw-tooth brick dentils under the eaves. The westernmost second-storey window was originally a taking-in door to the street, however the lower part had been carefully in-filled with modern brick and a stone sill to create a window (**Plate 136**).

The north elevation (**Plates 139-140**) had only five bays visible, because the three west bays were abutted by Building B5. The windows had segmental brick heads, with stone sills and there was a saw-tooth brick dentil course below the eaves. On the ground storey there was a large double doorway in bay 5 (formerly rail-accessed), with window openings to bays 6 to 8 (from west). The window in bay 6 had a door inserted post 1956.

Interior Description: Internally this building was a large open floored workshop, B4G1 (**Plate 142**). There was a large composite lintel in the east wall (**Plate 141**), inserted when B4 was built to form a direct link with B3G1, although now infilled with modern blockwork. The first floor had been inserted and subdivided into two large rooms, B4F1 (**Plate 144**) and B4F2 (**Plate 143, Illustration 41**).

Discussion: Building B4, along with B3, were seemingly both industrial buildings which had been incorporated into the Whitehall Road range, whilst the remainder of the range appeared to have been administrative or domestic. Whether the narrow range of buildings that appeared on Brierley's map of 1866 (**Illustration 7**) had originally continued this functional division is unknown. Although the subsequent redevelopment with buildings B3 and B4 could indicate that industrial expansion and the preservation of existing infrastructure was deemed to have priority over initial functional divisions created on the site. In any case public perception of the works remained a concern, and all buildings fronting onto Whitehall Road were built to an overarching architectural style in spite of internal function.

4.3.9 Building B5

Introduction: Building B5 was a large shed situated at the western end of the site and aligned with the western boundary (**Illustration 2**). It was a large

double-height workshop building measuring 36m x 15m (**Illustration 30**) of a modern brick pier and panel construction with tall parapets concealing a pitched roof behind.

Historic Evolution: A building was originally constructed on this site in the 1860s, as depicted on the Brierly map of 1866 (**Illustration 4**). It was originally a free standing structure, only later connected to the main front range in the late 1880s. At this time Building B5 was referred to as a smith's shop. The surveyed building which latterly occupied the site of the original smith's shop was a rebuild of 1960s date, for which the plans existed. However, it appeared that the footprint of the original building was respected when this later construction took place.

Exterior Description: The east elevation of Building B5 had a brick pier-and-panel construction, possessing steel-framed windows with protruding concrete surrounds in the Doncasters' house-style (see **Illustrations 42-45** for 1967 construction drawings). The elevation comprised 10 window bays with a large central doorway to bay 5, with smaller double doorways to bays 2 and 7. The west and north elevations were of identical construction, with high-level steel-framed windows and concrete details.

Interior Description: The interior demonstrated nothing of the original function of the building, and the modern concrete floor obscured any earlier features which may have remained (**Plates 149, 150**). It was only the roof structure which was of historical interest. This was constructed from a wrought iron trusses and clearly dated to the 19th century (**Illustration 47**). They had angled iron principals and diagonals, bar iron ties and forged unions (**Plates 152-161**). The upper face of the principals had short sections of angled iron (of a smaller section) fixed at regularly intervals along their length (**Plate 161**). It was likely that these angles were fixing point for slating laths, indicating the roof covering of the original building.

Discussion: The roof trusses of Building B5 were of a similar construction to those found in Buildings E1 and G1.1 and were very likely to be contemporary. It was initially suggested that the cast-iron columns, upon which the trusses would have been originally supported (Fitzgerald 2004, fig. 15), could be present encased within the modern wall piers of the building (Kinchin-smith 2005, 21). However, upon detailed examination it was discovered that each pier only contained conventional rolled-steel stanchions (**Plate 151**), which

clearly dated to the construction of the present structure in the 1967 (see **Illustration 45**). It was apparent therefore, that the 19th-century roof structure was retained and repositioned over the new building. This no doubt saved a certain amount of expenditure; however, it is also no small testament to the quality of nineteenth-century engineering.

4.3.10 Building Group C – Welfare Facilities

Introduction: Buildings C1 and C1.1 (**Plates 162-172**) were centrally located close to the western boundary to the site, immediately below an inclined access road and to the west of Building I1. They comprised two abutting rectangular structures, with building C1 measuring 10.5m x 7.05m, and building C1 8.85m x 16.35m. Building C1, is a female toilet block, whilst Building C1.1 is a female cloakroom and ambulance block.

Historical Evolution: The buildings first appeared by the time of the production of the 1957 site plan (**Illustration 21**), the site having previously been occupied by branches of the works internal rail network. This correlated with the partially surviving brass numerals '195-' applied at centre of Building C1.1. The buildings as they appeared on the plan, although depicting accurately the internal divisions, had inaccurately illustrated the eastern wall of C1 as projecting further east than that of C1.1, whereas the buildings were accurately plotted by the production of the 1963 OS map (**Illustration 22**). The inconsistency could be a result of inaccurate survey or due to the plan being drafted prior to completion of construction. Cartographic evidence does not distinguish that buildings C1 and C1.1 were of different construction phases, however survey clearly implied that C1.1 post dated C1.

Exterior Description: Building C1 was a small single storey brick building with a low parapet (**Plate 162**) concealed a flat concrete roof. The east elevation had a double doorway with protruding concrete surrounds, whilst the north elevations had a row of five high level small steel-framed windows with protruding concrete surrounds.

Building C1.1 (**Plate 163**) was a single storey brick building over double the size of C1, although of similar appearance. The long eastern elevation comprised eight bays containing steel framed windows in concrete surrounds with double doors in bays 2 and 7. These doors had gold painted descriptions on the glazed top-light, 'Surgery' (bay 2) and 'Women' s' (bay 7). The

south elevation has three metal-framed windows.

Interior Description: Internally, Building C1 comprised a lobby (**Plate 171**) with a store to the north and a large washroom to the west (**Plate 172**). Whilst the internal arrangement of Building C1.1 comprised two distinct areas, correlating with the names above the external doors. The southern part has a central corridor (**Plate 166**), with rooms leading off used as toilets, washrooms, offices and stores (**Plates 165-170**). The northern room (**Plate 164**) would have acted as the surgery.

Discussion: Building group C were two closely phased structures creating a welfare block built in Doncasters distinctive constructional style in proximity to the North Inspection (Building I1) c1957. Prior to the construction of Buildings C1 and C1.1, Building F had served as the ambulance block and female washroom (recorded in 1956 plan of proposed alterations **Illustration 60**). After the transferral of these facilities to C1 and C1.1, Building F became a laboratory and office. Consequently Buildings C1 and C1.1 were devised to free up earlier structures and relocate facilities as part of larger reinvestment after the acquisition of the site by Doncasters.

4.3.11 Building D1 – The ‘Concorde Building’

Introduction: Building D1 was positioned between Buildings E1 and I1 in the southwest part of the site (**Illustration 2**). It was a large two storey flat roofed building with a cast-concrete frame and a trapezoid footprint, measuring 23m x 38m.

Historical Evolution: Building D1 was built c1972 to enable Doncasters to develop blades and parts for Rolls Royce Olympus Engines and was known as ‘the concorde building’ . Copies of the original construction plans dated 1972 (**Illustrations 33-35**) indicate that the design appears to have been executed as planned.

Exterior Description: The building was divided into seven bays by concrete piers, between which were continuous metal-framed fenestration with corrugated steel cladding above and below at second storey level and brick panelling at the first storey level (**Plate 173 & 175**). The south and north elevations (**Plate 174**) were of brick laid in stretcher bond.

Interior Description: The internal layout is characterised by the two principle

floor spaces; ground and first. These are essentially open-plan layouts with small semi-glazed offices positioned at intervals along the perimeter walls. The ground floor (**Plate 177, 179**) was a workshop with a substantial electrical mains power system (**Plate 178**) required for computer controlled engineering machines. Access between floors (**Illustration 35**) was via precast-concrete stair flights (**Plates 176,182**) with subtle panelled decoration at the head of each flight. The first floor (**Plate 180**) was partitioned into four main areas, engineers, drawing office, printing and accounts (**Illustration 36**). A suite of 'executive' offices ran along the north wall (**Plate 181**).

Discussion: Although architecturally of little interest, the workshops and offices within building D1 are notable due to their connection with the production of Rolls Royce Olympus Engine turbine blades. The transition into precision engineering for the aerospace industry was a departure from previous processes undertaken at Monk Bridge Forge, and became a crucial product for the works over the following quarter of a century.

4.3.12 Buildings E1 and E1.1 – Former A Shop

Introduction: Building E1 was located to the west of the entrance and east of Building D. Much of the historic fabric of Building E1 survived, comprising cast-iron columns (**plate 190**), lattice girders (**plate 207**), roof trusses (**plate 206**), brick engine houses (**plate 205**) and imposing brick gables (**plate 185**), one of which has a carved date-stone of 1861 (**Plate 183**).

Historic Evolution: Along with I1, Building E1 formed part of a large 'L' shaped complex associated with Kitson's early westward expansion of the Monk Bridge site in the mid-19th century (**Illustration 6**). It is highly likely that these buildings represented the site of the first Steelworks, with building E1 operating as the steel production plant and Building I1 part of the steel tyre mill.

Exterior Description: Building E1 was a large rectangular three aisled shed, with a central aisle measuring 13.5m x 47.5m and side aisles measuring 5.5m x 47.5m (west) and 5.5m x 22m (east).

The western elevation was of 1950s/1960s brick pier-and-panel curtain walling and steel framed windows in the Doncasters house-style (**Plates 188-189**) which indicated that the elevation had likely initially been open-sided. The first bay of primary brickwork towards the south end had first phase round-headed

bricks forming a large doorway and window with a segmental brick head and stone sill. The remainder of the elevation comprised two phases of post-1950 curtain walling, with the remains of a first phase two storey brick water tank/engine-house at the northern end.

The south elevation (**Plates 184-185**) was of a similar design to that found on the eastern side of the site, possessing a large central gable flanked by two smaller gables, marking the positions of two side aisles (**Illustration 41**). The central gable had three large arched openings, which had received inserted windows. The smaller gable to the west had been partially blocked with a brick infilling which was also pierced by a smaller window opening with a segmental head. The east gable retained an open doorway that housed an inserted modern roller shutter door. A clerestory located in the upper part of the gable, with a blocked oculus vent, demarked the position of a former hot working louver/vent. The original stone copings had been replaced.

Building E1.1 had been built within the south-east aisle of Building E1, partially removing the eastern elevation of E1. It has a modern construction, with a new brick eastern wall, and a modern pent roof supported on rolled steel joists, c.1975 in date. The construction of E 1.1 entailed the removal of the external cast-iron columns and the roof trusses in this section of building E1. The portion of the original east elevation which did survive (**Illustrations 42-46**) consisted of a highly decorative eastern gable of a third engine house (**Plate 186**), and the east elevation of the north east engine house. It possessed a large arched entrance door (now blocked) stone coping and kneelers, a consoled elliptical pediment bearing a 'hanging ram' motif and a date-stone of 1861 (**Plate 183**). The original form of the open sided shed survived between these two structural elements of the building, with the gap spanned by a fabricated lattice wrought iron girder (**Plate 210**), which was supported at its mid-point by a slender cast-iron column. A later brick wall had been constructed below the girder, thereby enclosing the formerly open sided shed. There were sections of solid plate girder (**Plate 197-198**) located on the north of the main aisle divisions immediately to the west of the north brick gable with the 1861 date-stone. The correlation of the blocked doorway through the gable and alignment of the plate girders suggests that there may have been a thoroughfare, road, or railway line through this part of the building, although this theory is not supported by historic mapping.

The northern end of the building was marked by two brick-built engine houses (**Plate 187, & 207-208**), one situated at either corner of the structure (**Illustration 39**). The former open space between the two houses had been infilled with a later brick wall containing a large door.

Interior Description: The interior of building E1 (**Illustration 39**) represented a well preserved example of a large manufacturing shed dating to the mid-19th century. The interior was divided into three aisles, orientated north-south. The roof structure of the central aisle was similar to that of Building B5, having angled iron principals and diagonals, bar iron ties and forged unions (**Plates 199-204, & 209**). The trusses were supported on a combination of fabricated lattice (**Plate 210**) and plate girders (**Plate 197**), which were in turn supported by cylindrical cast-iron columns (**Plates 193,197,198**). The spacing of the columns reflected the use of the differing longitudinal girders. On both sides the three columns were positioned in such a way that the resulting central space was less than those to either side, 6.5m and 13.2m respectively. The lattice girder was used to span the larger gap whilst the plate girder bridged the central gap.

The two engine houses located at the northern end of the building survived almost complete (**Plates 207-208**), although their interiors had been heavily altered (**Plates 205,206**). The interior of the eastern engine house contained a prefabricated office with a modern ceiling. During the monitored demolition of the building: the interior north, west and east walls of the engine house were revealed, but were found to contain no historical features. The interior ground and first floors of the western engine house were similarly devoid of any first phase features (**Plates 211-214**). The northern elevations of both engine houses contained the remnants of truncated fabricated girders set on brick buttresses (**Plate 306**). These indicated the position of beams that had spanned the 1860s tyre mill prior to its demolition.

Discussion: The building had been extensively altered to facilitate modern uses of the interior space (**Plates 192-194**), however the initial layout could still be understood (**Illustration 39**). The original building was a roofed space with open sides and brick walling forming the south elevation and southernmost bays of the east and west elevations, with a prominent centrally positioned eastern gable, that may have had been replicated to the west and two brick water-tower/engine houses in the northern corners.

It is suggested that that Building E1 was the site of Kitson' s earliest move into the production of crucible steel, to be employed in the manufacture of steel tyres. In the contemporary summary of the development of the site, '*Fortunes made in Business* (1887)' it states that; "*Steel making within its more improved system, has been included in the operations of the Monk Bridge works. There is a large furnace of the Siemens-martin pattern always active.*" This 1880s steel plant was located on the southern section of the larger extent of the works, to the south of Whitehall Road (Fitzgerald 2004). However, the extract from '*Fortunes Made in Business*' also mentions the fact that previous to the installation of this plant, "*the steel used by Messrs, Kitson for tires was made in crucibles.*" Another reference, this time in found in '*Leeds Contemporary Sketches and Reviews*' states that "*the steel here used here for tyres was made on the old Sheffield principal, cast into ingots from crucibles.*"

The Archaeological Desktop Assessment (Kinchin-Smith 2005) for the site concludes that Building E1 is the likely position of the hearth with the possible site marked by a cluster of small circles on the 1923 site plan (**Illustration 16**). However, it is unlikely that the crucible plant was still in existence by the 1920s, particularly in view of the fact that a much more efficient method of steel production was installed on the southern part of the site in the 1880s. Furthermore, if the 'Sheffield method' of crucible steel making was taking place on the site, then evidence of crucible stacks would have been evident on the plans and not clusters of crucible pots set in a U-shaped pattern. Rather than the crucible steel being produced by the Sheffield coke fired method, it would appear that the regenerative gas furnace was used to provide the heat for the melting of steel.

Barraclough (1984) reproduces a list of companies employing the Siemens regenerative furnaces for crucible steel dating from 1880 among which the Monk Bridge Iron Company is mentioned as possessing a furnace with a 72 crucible capacity. It is entirely possible that a gas fired furnace was contained within Building E. If the 1923 site plan can be taken as any form of evidence for this then the presence of gas mains running into the building demonstrates that at least the potential for the supply of fuel was present.

4.3.13 Building Group F1, F1.1 and F1.3

Introduction: Building group F (**Illustration 62**) was a rectangular two storey range, orientated north-south, and positioned immediately to the west of the main entrance (**Illustration 2**). Together the range measured 9m x 25.

Historic Evolution: The site of Building group F remained undeveloped by the works until the construction of F1 c1916-1923 (**Illustration 20**). The building appears on the 1944 site plan where it is labelled as 'Ambulance' (**Illustration 17**). A planning application produced in 1956 illustrated that the northern half of Building F1 had only been a single storey high, and the application proposed to extend it a further storey (**Illustration 60**). Annotations on the application recorded that in addition to providing an ambulance room, the building also housed segregated male and female washrooms and proposed new first floor offices. By the production of the 1957 site plan Building F1 had been refitted as a laboratory with ambulance facilities relocated to Building group C (**Illustration 21**).

A late 19th-century shed of unknown function which had been located to the north of F1 was replaced by a garage building c1930s and the plot subsequently redeveloped again c1950 to make way for a new washroom facility: Building F1.2 (**Illustration 21**). Although Building F1.2 had been built in exact alignment to Building F1, a 3m gap had been left between them. This gap was later developed, and the buildings linked, in the early 1960s: Building F1.3 (**Illustration 22**). The construction of Buildings F1.2 and F1.3 formed part of the re-organisation and upgrading of facilities during the 1950s-1960s. An application produced during this period for further wash facilities was recovered, although the location of the development was unknown (**Illustration 61**).

Exterior Description: Building F1 was constructed of brick with a hipped slate roof over the southern half and flat roof to the north with corbelled brick gutter brackets. The building was square in plan, measuring c.9m x 9m, with angled corners to the south elevation (**Plates 215-216**). The south elevation was of two bays, each of which contained multi-paned timber framed windows with the upper panes comprising bottom-hung openings on both ground and first floor. Further window bays were located on both floors of the southeast angled corner and a double doorway in the southwest corner. The majority of windows possessed angled brick sills and sandstone lintels with a simple

incised moulding forming the window head. The east and west elevations were of four bays, although there was a structural joint at the mid-point (**Plate 217**), indicating that the upper storey was originally of only two bays (see **Illustration 60**). There was a converted doorway in the southernmost bay of the east elevation (**Plate 217**) and a small window between the southernmost two first floor windows that suggest the location of a former toilet, although this is not depicted as such on the 1956 alteration plan (**Illustration 60**). The west elevation was largely concealed by a pentice attached to Building E1.1, although blocked windows were noted at ground level (**Plate 215**).

Building F1.2 (**Plates 218,219**) was a two storey toilet and locker room block, measuring 9m x 13m, and bore lettering on the northern elevation commemorating the year 1956. It was brick built in the Doncasters house style with a flat roof concealed behind a low parapet. The east elevation has seven bays, five of which were fenestrated with metal-framed window, with blind bays at the northern end. There was an inserted door and window in the south end of the east elevation. The north elevation (**Plate 219**) was divided into four bays with a pair of central single doors at ground floor flanked by windows. The first floor has four windows, one in each bay, with the concrete surround of the two central ones forming a continuous frame around the windows.

Building F1.3 was positioned between Buildings F1 and F1.2 (**Illustration 2**) and measured 9m x 3m. It was a 2-storey, brick infill with a flat roof behind a low parapet (note it was described as F1.1 in the assessment text, Kinchin-Smith 2005). On both east and west elevations it comprised a single bay. On the eastern elevation there was a narrow ground floor doorway and a small first storey timber framed window (**Plate 218**).

Interior Description: The interior of Building F1 (**Illustration 62**) was of some interest due to the survival of the laboratory benches and equipment. The internal space F1 G3 was divided by a half-glazed partition, creating office and working areas complete with hardwood benches and laboratory sinks (**Plates 220,221,225**). A further ground floor room F1G2 (**Plate 226**) functioned as a chemical store and contains a large fume cupboard. The upper floor rooms had latterly functioned as an office space and other than the surviving original window, contained nothing in the way of original features (**Plates 227-229**). It is worth noting that one of the former upper floor windows in the southwest

corner had been removed and converted into a taking-in door (**Plate 215**).

The interior of Building F1.2 remained little altered since its construction. It contained staff welfare facilities, with showers and toilets on the ground floor (**Plates 222,223,224**) and a large proportion of the first floor taken up by employee' s lockers (**Plates 230-233**). The lockers were similar in design to those found in the mining industry with two tiers of storage lockers placed back-to-back and electric heating elements running through the centre to dry work clothes for the following day.

The interior of F1.3 had been divided into small rooms (**Plates 228,229**) which had been fitted out and decorated as offices.

Discussion: Although Building F1 has been interpreted as an early laboratory (Kinchin-Smith 2005), no positive evidence for this had been identified, and it is thought that it had likely been built as an ambulance room. The lettering 'Laboratory' above the entrance doorway into Building F1 (**Plate 215**), is identical in design to that Building C1.2., indicating a contemporary period of application. The expansion and improvement of staff facilities by Doncasters after acquiring the site, as represented by F1.2 and other buildings such as Building group C, demonstrates that earlier welfare facilities must have been seen as insufficient and could suggest a concerted effort by the new owners to win the favour of the workforce.

4.3.14 Building Group G1, G1.1, G1.2, and G1.3

Introduction: Building group G was located to the east of the main entrance, immediately north of Buildings A3 and A4 and west of Buildings H1-1.2 (**Illustration 2**). The group formed a rectangular range projecting south from Building I4, to which it was open to in the north.

Historical Evolution: The site of building group G was central in the earliest development of Monk Bridge Iron and Steel Works. Whitham' s 1851 works was rebuilt c1860 and expanded to fully cover the site of the building group. Building G1 was constructed c1950 after the demolition of the southern sheds of the earlier works. The building was subsequently expanded eastward c1956 and again c1980s.

The construction methods employed in its construction were found to be very similar to 'B' shop depicted on a building plan for proposed alterations

(**Illustration 68**), which had been located directly to the west of Building G1 (**Illustration 21**). This suggested that both the 'B' shop and 'C' shop (Building G1) were contemporary.

Although the main fabric of Building G1 dated to the 1950s-60s, survey suggested at time of construction it had incorporated parts of the c1860s works. Structural elements found in the southern elevation of Building G1 and in Building G1.1 directly correlated with structural details depicted on c1879 deposited building plans of alterations to the earlier shed (**Illustrations 65-67**). The roof structure at the southern end of the c1860 shed was illustrated as comprising a wrought iron truss supported on a fabricated girder resting on a stone pad in brickwork to the west, and to the east supported by a cast-iron column.

The recorded remnants included several cast iron columns and elements of fabricated girders. The girders would have originally run north-south on either side of the building, each supported on five cast iron columns, creating a span of c45' (13.8m). The structure had been open sided, communicating with the rolling mill on the west, and No. 1 puddling shed to the east. The c1860 shed was further extended to join the north wall of the Whitehall Road range in the c1890s to provide a covered loading area over one of the internal factory railway lines (**Illustrations 10-11**).

Exterior Description: Building G1 was a large single-storey rectangular shed, measuring c.15m x 25, with a portal frame roof. The south elevation (**Plates 236,237**) had a large central three bay brick gable, flanked by flat-topped single bays. The central gable had a tall central round-headed blind arch with a projecting double doorway within it, which was flanked by blind window-openings to either side with bull-nosed brick sills and rubbed-brick lintels. The bays to either side of the gable were stepped back with a central tall multi-paned steel framed window with bull-nosed brick sills and rubbed-brick lintels. In addition the flanking bays had brick parapets concealing the continuing pitch of the central gable. The east elevation (**Plates 238-241**) was of brick pier-and-panel construction, possessing pairs of metal framed windows on either side of three large roller shutter access doors. The west elevation, a former external wall now encased by Building G1.3, was of a similar construction, comprising brick pier-and-panel bays, each with two steel-framed windows, apart from bays 1 and 9 where the windows were blocked

with modern brick.

Building G1.1 was located at the northern end of Building G1 (**Illustration 2**) and measured c.8m x 10m in size. Building G1.1 had a double pitched roof with a valley gutter, the western pitch of which matched the pitch of G1. Building G1.1 was an annex that formed the junction between the 1851 puddling shed and the rolling mill. Building G1.2 was constructed out from the western end of G1.1 c1956, as an extension to that building. It was of steel frame construction, with a single roof bay supported on fabricated trusses, and measured 13m x 8m.

Building G1.3 (**Plates 235-235**) was a large modern rectangular structure, located to the east of the entrance into the site and built against the west wall of Building G1. It was of steel frame construction with clad in profile metal sheeting and measured 8m x 24.5m.

Interior Description: The interior of building group G had was largely open plan, interrupted by occasional intermediary columns supporting the roof structure, and a short span of corrugated steel profile cladding between G1 and G1.1 (**Plates 242 & 257**). Building G1.2 was, however, entirely separate and contained a series of internal tanks (**Plate 255**) and extractors (**Plate 256**), some of which were located on the roof and which together operated as an effluent plant. Scaring in the concrete floor throughout G1 –G1.2 would have corresponded with the location of fixed plant that had subsequently been removed when the works closed.

Encased within the internal fabric of the south gable of Building G1 were a cylindrical cast-iron column and truncated fabricated girder (**Plates 258-259**) that represented *in situ* remnants of the c1860 South Puddling Shed that had formally been situated on the site of Building group G (**Illustration 69**). In addition Building G1.1 contained three further cast-iron columns forming three corners of a square with sides of 30½ feet (9.4m). The support for the fourth southwest corner had been provided by the now demolished No 1 engine house (**Illustration 52**). The two northeastern columns supported a fabricated lattice girder (**Plate 243**) which originally spanned the width of the No 2 puddling shed. The columns also support two surviving wrought iron roof trusses (**Plates 244-245, & 252-253**) that had similarities in design to those in Building B5 and E1. These have angled iron principals and bar iron ties all with forged knuckles (**Plates 246-251**). The original angled iron purlins

are also present as are some timber rafters. The rafters stop some distance short of the apex of the angle of the roof, thus indicating where there was formerly a clerestoried ventilated roof section (**Illustration 53**).

Discussion: Building group G is of interest for a couple of reasons. Primarily the southern gable of Building G1 was not constructed in the prevalent Doncasters house style. Rather, the arrangement of a central gable flanked either side by single bays mirrored earlier 19th-century structures on the site. It is suggested that the brickwork may date to c.1952 (see proposal drawing with date on external elevation, **Illustration 51**) and if so is one of the first construction projects undertaken by Doncasters following their acquisition of the site in 1951. In contrast other elevations were more in keeping with the contemporary architectural arrangement of the site. Secondly, Buildings G1 and G1.1 preserved remnants of the earlier 1860s Southern Puddling Shed which corroborated with archived material in providing detail of the construction methods employed in that structure.

4.3.15 Building Group H1, H1.1, H1.2, H2 and H2.1 – Former D Shop

Introduction: Buildings H1, H1.1, H1.2, H2 and H2.1 were a group of buildings positioned adjacent to the Leeds Liverpool Canal at the eastern edge of the site (**Illustration 2**). H1-H1.2 was a rectangular shed measuring 23m x 33m. Sandwiched between H1-H1.2 and the canal boundary wall were Buildings H2-H2.1: a narrow range measuring 4m x 31m.

Historic Evolution: Up until the 1930s (**Illustration 15**) the site of building group H had been partially covered by a pair of rectilinear puddling sheds dating from the early period of the forge c.1860s. These sheds were subsequently demolished and the site was used as a scrap yard between 1944 (**Illustration 17**) and 1953 (**Illustration 20**) when it was traversed by a travelling crane and several branches of the internal rail network. The site was again redeveloped in the mid 1950s when the area north of the site was resurfaced for use as a car park, and Building H1 and three smaller ancillary buildings were erected (**Illustration 21**). Building H1 was recorded as the 'D' shop, with internal plans showing a number of machines with labels of 'Hand Straightening' and 'Heated Die Straightening Dept'. An external brass numerical date on Building H1 commemorated the buildings completion in 1957 (**Plate 263**).

Subsequent expansion of the building group occurred in the following decade, and by the release of the 1963 OS map (**Illustration 21**), appeared with its final footprint. The second phase of expansion, Building H1.1, had been towards the south of H1, with a final expansion, Building H1.2 and Buildings H2-H2.1 following soon after. Brass dates on the western elevation recorded the second and third phases as having been completed by 1964 and 1965 respectively, indicating that the OS map of 1963 may have recorded an earlier shed or that both phases of extension were already under construction. Drawings for the latter extension (**Illustration 71-73**) depict the exposed profile of the roof, a detail which was actually concealed during construction, or soon afterwards.

Exterior Description: Building H1-H1.2 was a brick pier and panel structure built in the Doncasters house-style of the 1950s-60s (**Plates 260-264**). The east and west elevations formed nine even bays with a brick parapet concealing a north-light roof. The western elevation contained four entrances separated by pairs of tall multi-paned steel framed windows with concrete lintels and bull-nosed brick sills. Between the doors at the north and south and the end of the elevation were further single windows. The doors themselves were double width plain pedestrian timber doors with upper glazed panels.

The north and south elevations contained continuous multi-paned metal framed fenestration, with corrugated steel profile cladding above (**Plate 265-267**). West of centre in the northern elevation was a tall inserted vehicular entrance.

Buildings H2 and H2.1 abutted the east wall of Buildings H1, H1.1 and H1.2 (**Plate 261**). They were a continuous single storey structure with a mono-pitched corrugated steel clad roof. In the northern elevation was a double width timber door with a multi-paned glazed upper panel, whilst in the south there was a single width pedestrian door.

Interior Description: Internally, buildings H1, H1.1 and H1.2 were largely open plan, although there were a number of inserted offices along the southern wall (**Plates 268-272**). Structurally the range comprised a steel frame in the north and south elevations and brick piers along the east and west elevations that supported a north-light roof fabricated from lengths of angle-iron. The floor throughout was concrete and largely uninterrupted due to the structure not requiring intermediate roof supports.

Buildings H2 and H2.1 were plastered throughout, and no original features, windows or openings were extant. However from the riverbank (**Plate 367**) a blocked semi-circular arch was observed in the east canal wall that may be the remnants of the original east wall of the southern puddling shed (see oil painting of the site, c.1853 for comparison in Fitzgerald 2004, fig.3). Unfortunately, restricted access along the canal towpath and thick rendering of the eastern elevation of the wall prevented further examination of this feature.

Discussion: Building group H was a good example of mid-twentieth century purpose-built industrial architecture. The building proved easily expandable with an open multi-functional space that did not sacrifice the architectural style. The facility was initially built to accommodate shaping processes associated with jet-turbine blade production, although it was later occupied by inspection and packing activities.

4.3.16 Buildings I1 and I1.1

Introduction: Building I1 was located in the western part of the site (**Illustrations 2 & 63**). It was a roughly rectangular brick built structure with a pitched corrugated sheet roof, which abutted Building I2.1 to the west.

Historic Evolution: Building I1 was constructed in c.1860, initially appearing on the Brierley's 1866 map (**Illustration 7**) when it formed part of a much larger open sided forge building, connected to the northern end of Building E1. Since construction it had undergone significant alterations, including the reconstruction of the majority of external walls (**Illustration 83**).

Exterior Description: The western gable of Building I1 retained elements of the 1860s building and continued in the general style of the other earlier buildings on the site (Buildings E1, G1) with three tall arched opening (now blocked to half height). The rubbed-brick arches were unusual in having cast-iron keystones. In addition the sandstone foundation course of this gable was extant, presumably due to reduction in original ground levels (**Plate 273**). The upper section of the gable, above the level of the central opening, had been rebuilt, presumably at the same time as the building was re-roofed and the open sides infilled. The 1921 aerial photograph of the site (Fitzgerald 2004, fig.34), illustrated that there was originally a raised pediment containing a

central oculus window/vent and a continuous ventilated hot working roof.

The single bay returns to the north and south contained remnants of original features (**Plates 274-275**). To the north was a large opening, partially infilled with later 1950s brickwork and to the south was a round-headed brick window with a bull-nosed brick sill containing a metal frame. Rectangular cast-iron plates (**Plates 274,275**) set just below wall head height were present on both elevations. These were linked to a wrought iron tie rod with a forged knuckle at its mid point (**Plate 293**) which runs along the interior face of the west wall of the building.

Interior: The interior of the building contained two cast-iron columns (**Plates 287, 290**) which related to the 1860s open sided forge and demarked the former width of the building. Following the removal of a modern suspended ceiling (**Plate 286**) the heads of the cast-iron columns (**Plate 291**) were found to be of a similar design to those present in Buildings G1, G1.1 and E1 (**Plates 198,251,253**). It is worth noting however, that in relation to those in Building I1, the square section bolting face (**Plate 291**) had been truncated and the original longitudinal fabricated girders, which would have formerly supported the roof of the open sided shed had been replaced with modern RSJs. This was presumably undertaken in the 1950s-60s when the roof structure comprising of modern trusses constructed from bolted rolled steel angles was inserted (**Plates 288,289,292**).

Built against the north of Building I1, was I1.1 (**Plate 274**). This was a pent-roofed extension constructed with brick walling and large metal-framed windows typical of the 1950s-60s period of expansion and rebuilding.

Discussion: The building represented the oldest surviving element of the northern end of the early forge buildings. Although heavily altered in the 1950s-60s it preserved the original west elevation which was characteristic of the early architectural style applied to the industrial buildings across the works. Additionally internal remnants of the earlier structure indicate that a similar construction method had been employed across the site during the latter half of the 19th century.

4.3.17 Buildings I2.1, I2.2, I2.3 and I2.4

Introduction: Built against the east of Building I1 was a large shed comprising of four ranges represented by Building I2.1: a modern double height steel-

framed pent-roofed range measuring 33m x 7m; Building I2.2 (**Plate 294**): a triple-height steel-frame structure measuring 33m x 8.5m; and Buildings I2.3 and I2.4 which both measured 33m x 4m.

Historic Evolution: The area to the north of Building E had been built on from the mid-19th century (**Illustration 6**), and started to expand eastward shortly after (**Illustration 7**). By the end of the 19th century the sheds in this location largely remained unaltered right into the middle of the 20th century (**Illustrations 8-15**). By c1950 the sheds had undergone significant remodelling. In the area of building group I2 the area remained essentially covered over (**Illustration 20**), although the extent to which earlier structures had been rebuilt is not clear from cartographic evidence (**Illustration 21**). Historic plans illustrating the arrangement of plant within the workshops highlighted that the internal layout had changed with the former gas-fuelled furnaces along the north elevation (**Illustration 16**) replaced with a Blade Moulding Department (**Illustration 21**).

Exterior Description: The building had modern profile cladding with a pitched corrugated sheet clad roof which exhibited no evidence for a ventilation clerestory.

Interior Description: Massive stanchions (**Plate 298**) within the structure, carrying modern rolled steel overhead-crane runners and deep, light-weight longitudinal lattice trusses which carried the roof trusses. The trusses were bolted together from rolled steel sections, both having gusset plates at junctions (**Plate 297**).

Discussion: Buildings I2.1, I2.3 and I2.4 are of limited historical, or technical interest, and date to the 1950s refurbishment of the site. These are essentially side extensions, re-builds and infilling to and between earlier sheds. It is probable that they were built to replace the working floors lost by the demolition of the earlier tyre mill. Although Building I2.2 appeared earlier than the other elements, an aerial photograph taken in 1921 (Fitzgerald 2004, fig.34) demonstrated that by that date the former buildings of the tyre mill were still extant. Consequently despite Building I2.2 being not as early as first envisaged, it is still probable that it was built a short while before the other elements.

4.3.18 Buildings I, I3.1, I3.2 and I3.3

Introduction: Building group I3 represented a set of westerly expansions to Building group I2 constructed between Buildings I2.1-2.3 and I4.1-4.2. It was a triple-height, three aisled, steel-framed range (**Plate 311**) built in multiple phases (**Illustration 19**).

Historic Evolution: This building group represented some the last phases of covering the yard between the earlier two forge buildings, effectively bridging the gap between them. The area to the north of Building E had been built on from the mid-19th century (**Illustration 6**), and started to expanded eastward shortly after (**Illustration 7**). By the end of the 19th century the sheds in this location largely remained unaltered right into the middle of the 20th century (**Illustrations 8-15**). By c1950 the sheds had undergone significant remodelling. In the area of building group I3 the southern range (Building I3), and the northern range (Building I3.3) had been constructed, whilst the area between them had been cleared and left as an open yard (**Illustration 20**). Although the central areas were also built over (Buildings I3.1 and I3.2) by the end of the 1950s (**Illustration 21**). Historic plans illustrating the arrangement of plant within the workshops highlighted that the internal layout had also changed. Although the major east-west lines, presumably indicating overhead travelling cranes and therefore internal stanchions, from the east of Building I remained the same, the location of machine bases had been altered. In the northern half of Building group I3-I3.3 an Upsetter Department had been installed.

Exterior Description: The southern aisle built against Building I4 (**Plate 305**), comprised Building I3 which measured 9m x 15m. It was clad with corrugated asbestos, and had a slate roof and clerestory ventilation. The central and largest structure of this group was Building I3.1 (**Plate 311**) which was a triple-height, steel-framed range, measuring 15m x 13m. To the west of I3.1 was the smaller I3.2 that measured 12 x 7m. The northern range of the building group comprised Building I3.3. It was a triple-height steel-framed range, measuring 27m x 8m.

Interior Description: Internally within Building I3, structural support was provided by massive stanchions, which supported overhead-crane runners and rolled steel joists carrying later roof trusses (**Plates 303-304**). The roof trusses were bolted together from rolled steel sections, with gusset plates at junctions

(**Plates 301-302**). The northern range, Building I3.3, was similarly constructed including identical rolled steel overhead-crane runners and rolled steel joists.

The later phase of construction in the centre of the building group comprised massive stanchions bolted together from rolled steel sections, which carried rolled steel overhead-crane runners and rolled steel joists supporting roof trusses dated to the 1950s-60s. The trusses were constructed from bolted rolled steel sections, with gusset plates at junctions. Truncated north-south plate girders with observed in the north elevation of Building E (**Plate 306**), and were believed to be c1916-18 remnants of an earlier shed structure. Building I3.2 was a double-height steel-framed pent-roofed range of similar construction of building I3.1. Stanchions across the northern edge of Buildings I3.1 and I3.2 dated to c1933-1944.

Discussion: Similar to Building group I2; Buildings I3-I3.3 were of limited historical or technical interest. They mainly represented mid-late 20th century expansions around earlier external travelling cranes which had previously spanned a gap between the main east and west forge buildings.

4.3.19 Buildings I4, I4.1, I4.2 and I4.3 – former tyre mill

Introduction: Building group I4-I4.2 was a massive triple height steel framed structure with three aisles that dominated the centre of the site. The footprint of this group comprised of I4 to the south (measuring 39m x 9m **Plate 300**); I4.1 in the centre (measuring 50m x 13m **Plates 298, 312**); and I4.2 to the north (measuring 50m x 8.5m **Plate 299**). Building I4.3 was a long single-storey height pent roofed lean-to extension along the northern edge of Buildings I3.2 and I4.2, measuring 80m x 4m (**Plates 276-278**).

Historic Evolution: The area to the north of Building G had been built on from the mid-19th century (**Illustration 6**), and largely remained unaltered right into the start of the 20th century (**Illustrations 8-15**). Plan of proposed development from c1911 illustrated that at this time the sheds in this area were completely rebuilt expanding the footprint towards the west. By c1950 the sheds had been connected to the buildings to the west, covering over travelling cranes which had already traversed the gap. Historic plans illustrating the arrangement of plant within the workshops highlighted changes made to the internal layout. Although the major east-west overhead

travelling cranes remained the same, former Tyre Mill (**Illustration 16**), which had been historically located in Building group I4, had been replaced with new plant for a Screw Press Department (**Illustration 21**). Building I4.3 was built around the time of these changes c1950-60s, as an annex to the main building.

Exterior Description: Building I4.3 formed the northern elevation of the majority of building group I. It consisted of brick curtain walling, with steel-framed windows with brick sills and a continuous band of fenestration below the eaves, which was roofed with profiled metal cladding. The southern walls of Building group I4 largely consisted of uninterrupted corrugated steel profile cladding with, a large vehicular entrance brick panelling to the southwest relating to c1960s alterations.

Interior Description: The interior of buildings I4-I4.2 was of massive stanchions bolted together from rolled steel sections, carrying built-up overhead-crane runners and longitudinal lattice trusses which supported the roof trusses. The roof trusses (**Plate 307**) were bolted together from rolled steel sections, with gusset plates at junctions. The roof was covered with blue slate and there were continuous ventilation clerestories running along the ridges of the outer of Buildings, I4 and I4.2.

The junction of Building I4 and the earlier structure building G1.1 was marked by the survival of two cast-iron columns (**Plate 251-253**). They had bolting holes located on their northern faces indicating that the longitudinal girders of the original building extended north-south prior to the construction of the later shed. An aerial photograph of the site, dated to 1921 (Fitzgerald 2004, fig 34), illustrated the open sided nature of the sheds at this time and the furnace chimney rising through the roof of Building I4.

At the extreme eastern end of ranges I4-I4.1 was a series of small brick adjoining structures (**Plates 308-310**), including an electrical switch-room, with offices above. They were dated 1960 (**Plate 282**) and conformed to the style of contemporary buildings on the site such as H1 - H1.2.

Building I4.3 comprised stanchions and principal rafters of large, continuous rolled steel joists (see **Illustration 79** for construction details).

Discussion: Building Group I4 represented an early-20th century rebuilt of the earlier Tyre Mill. Historic fragments preserved from the earlier structure

indicated that the alignment of the ranges had changed from north-south to east-west, presumably indicating a major reworking of the internal functional arrangement. Subsequent refitting c1950s-60s coincided with the Doncasters' initiatives to move into the production of turbine blades.

4.3.20 Building I5 – press shop

Introduction: Building I5 was located against the eastern gable of Building I4 (**Illustration 83**). It was a large triple-height steel-framed extension measuring 16m x 26.5m (**Plates 279, 325**).

Historic Evolution: The site of Building I5 had not previously been built on. Building I5 itself was built c1973.

Exterior Description: The external elevations of Building I5 mainly comprised of uninterrupted corrugated steel profile cladding above a brick built first storey level with occasional steel framed windows and pedestrian doors.

Interior Description: Internally it comprised stanchions and roof trusses which were welded together from rolled steel sections, carrying rolled steel overhead-crane runners which were clad externally with profiled metal sheeting (**Plates 284-285**). Centred within the structure was a massive pit in which a large press had formally stood (**Plates 313 and 314**)

Discussion: Building I5 was by far the tallest building on the site, constructed to house a massive 14,000 ton press (see **illustrations 81-82**).

4.3.21 Buildings I6 and I6.1

Introduction: Building I6 and I6.1 were located in the northwest part of the site between the viaduct and Buildings I1 and I2. Building I6 was a tapering range of large modern workshops measuring 58m long and from 19.5m wide in the west to 10m in the east (**Illustration 83**). The building accommodated finishing processes for compressor Blades. Building I6.1 was a small modern garage/store situated to the east of I6 and was a free standing structure measuring 6m x 9m.

Historical Evolution: The initial construction on the site of Buildings I6 and I6.1 had been of twenty Siemens gas producers in c.1890s (**Illustration 9**) that produced gas to power Siemens furnaces. By the late 1920s these Siemens ovens had been replaced by a single more efficient gas producer (**Illustrations 15 and 17**). By the late 1950s, as part of larger reorganisation of the site

during the Doncasters takeover, the gas producer was demolished and the site resurfaced for use as a car park. Consequently it was onto this that Buildings I6 and I6.1 were built c1970. Neither building exhibited evidence of alterations to their fabric.

Exterior Description: Building I6 was steel-framed (**Plates 315-320**), with curtain walling of aluminium-framed windows, profiled metal cladding above brick footings and shallow pitched roof. Building I6.1 was similarly fabricated, though with a wide window in the western elevation.

Interior Description: Internally Building I6 was divided into four large workshops (**Plates 330-324**) by corrugated steel sheet partitions supported on light weight steel framework. The second workshop from the east was divided into two spaces (I6G2 and I6G3); otherwise the rooms were separate spaces. Communication between the workshops was typically external, with only I6G4 and I6G3 possessing an internal opening. The corrugated steel roof was supported on angle iron fabricated Warren trusses with vertical I-section steel columns.

Discussion: Buildings I6 and I6.1 comprised a modern workshop and store representative of the expansion and modernisation of the site c1970 during expansion into the production of high quality turbine blade forgings for the aerospace and gas turbine industries. The workshops in I6 appeared to have contained four separate finishing processes due to the restrictions on the movement of goods within the building.

4.3.22 Building Group J1 and J1.1 – compressor house and workshop

Introduction: Buildings J1 and J1.1 were built adjacent to the northeast boundary wall overlooking the canal (**Plate 325-326**). They were a single storey structure with a rectangular footprint that measured 5m x 22m and was subdivided into two phases of construction, Building J1 being to the north, with Building J1.1 built against the south wall of J1. The external walls were in the utilitarian house style adopted by Doncasters during the 1950s-60s, although elements of the internal structure date to the mid-to-late 19th century.

Historical Evolution: The site of building group J was initially built upon c1870-1880 (**Illustration 8**) comprising of a narrow range along the boundary wall with the Leeds & Liverpool Canal. Subsequent alterations were made to the

range and in the 1944 site plan the range was illustrated as having been shortened retaining only the northern half of the range (**Illustration 17**). By the production of the 1953 OS map (**Illustration 20**) the range had been extended to the south once again, and depicted in the 1957 site plan as two rooms; the northern noted as a Compressor, and the southern as a Joiners (**Illustration 21**).

External Description: Building group J comprised brick built elevations to the south and west with a low brick parapet concealing a flat concrete roof that was accessed from the south via a steel staircase (**Plate 326**). The external west and southern brick walls were of a single phase constructed in the Doncasters house-style. In the western wall of Building J1 (the compressor house) were three double doorways of which two contained roller shutters and the other glazed doors. In the western wall of Building J1.1 was a further double doorway in addition to a single door that was flanked on either side by windows with multi-paned steel frames and bull-nosed brick sills. The lintels across this elevation were of concrete. The southern wall of J1.1 contained a tall multi-paned steel framed window, and a blocked door.

Internal Description: Within both Buildings J1 and J1.1 (**Plates 330-332**) was a steel frame structure of vertical rolled steel I-beams which projected through the ceiling to support two large north-south orientated riveted iron box girders (**Plate 328**). This structure supported a pair of large cylindrical riveted iron tanks located at the northern end of the roof (**Plate 327**). Undated drawings depicting the tanks and girders (**Illustrations 84, 85**) were recovered suggesting that they were added, reusing the box girders, during the 1950s-60s. Their function would have been to provide reservoirs of compressed air for powering machinery in adjacent factory buildings.

Room J1.1 (**Plate 330**) was of the same phase as the southern and western external walls, dating to the 1950s-60s. Elements of an earlier 19th-century structure survived in Building J1 including the internal north, east and central dividing wall between the two buildings (**Illustration 86**). Features comprised a round headed blocked doorway in the southern wall (**Plate 329**), and three round headed blocked windows in the east wall (**Plate 331**) appeared to date pre 1882, and demonstrated the former character of the building. The blockings occurred during the 1950s-60s reorganisation of the buildings, when J1.1 was constructed and the west wall rebuilt.

Discussion: The fabric of Building J1 was largely 1950s-60s resulting from the reconstruction of the building and the addition of an extension (J1.1) when the works came under the control of Doncasters. Elements of an earlier late 19th-century building remained, although no evidence remained to distinguish the function of that building.

4.3.23 Building Group K (K1 to K1.15) - Viaduct Arches

Introduction: The northern boundary to the site (**Illustration 2**) was formed by the brick arches of the River Aire viaduct (**Plates 333, 338, 350 & 360**), the fabric of which was beyond the scope of this survey. The space beneath each arch had been utilised as either storage areas, or building plots for small free standing structures of varying dates and sizes. The viaduct branched in two towards the west side of the plot, creating a secondary line of three open arches which did not form part of this survey.

Historical Evolution: River Aire viaduct was constructed in the mid 1840s as part of wider improvements and expansion of the Leeds railway network. The interior of arches, for which this survey was concerned, only appeared on site plans, with OS maps recording the tracks of the railway which ran above. Despite this it is evident that from 1881 (**Illustration 8**) that several arches towards the western end of the site had been used by the sites internal network to access the northern side of the viaduct. Detailed plans of the interiors of the arches were produced in 1923 (**Illustration 16**) and 1944 (**Illustration 17**). In the 1944 plan the arches were numbered west to east as numbers 4-19. Of these arches no.s 4-6 (K1-K1.2) were used as railway sidings, no. 9 (K1.5) was noted as owned by L.N.E.R., no.s 10-11 (K1.6-K1.7) by G.N.R., and no.12 (K1.8) as a Tyre Boring Shop.

Descriptions: To facilitate survey the arches are numbered from west to east as follows (**Illustration 87**):

K1 Enclosed storage space with corrugated steel sheet ceiling and exhibiting Doncasters house-style of 1950-60s on southern and northern elevations (**Plates 333-334**);

K1.1 Open with steel gate across northern opening and blockwork silos along east wall (**Plate 335**);

K1.2 Open with no fixtures (**Plate 336**);

- K1.3* Partially enclosed store and workshops c1950s-60s. Inserted brick workshops located against the west wall and in the northern opening of the arch. The northern workshop projected beyond the arch to the north. The northern elevation of the workshop contained three multi-paned steel framed windows with solid brick lintel and bullnosed brick sill, and double doorway with plain modern timber door (**Plates 337-340**);
- K1.4* Enclosed workshop of late 1970-75. A steel framed corrugated sheet steel clad structure had been erected within the arch, and which projected north beyond the arch (**Plates 341 & 343**);
- K1.5* Open arch containing large modern tanks, and associated with a drop hammer to the north of the archway (**Plates 344-346**);
- K1.6* Open arch containing an inserted brick workshop with mono-pitched corrugated steel sheet roof, 1950s-60s (**Plates 347-348**). The east elevation of the workshop contained three multi-paned steel framed windows and a sliding timber door two with multi-paned upper glazed panels. The northern wall of the workshop contained an additional multi-paned steel framed window;
- K1.7* Partially enclosed arch with narrow brick built workshop adjacent to the eastern wall dating to c1950s-60s (**Plates 349**);
- K1.8* Enclosed arch internally cased in a timber frame of uprights along the east and west walls that supported two wall plates upon which were king-post trusses with trenched purlins (**Plates 350-354**). The northwest and west walls, and roof, were clad in thick horizontal boards. Many of the timbers contained redundant mortises and ambiguous carpentry marks, indicative of their re-use from an earlier structure. The shed also housed an early travelling crane supported on iron I-beam columns that with cast-iron shoes. The southern opening was enclosed with and largely glazed with a central double timber door. The north of the arch was closed in an original stone wall with three steep buttresses. This structure within the arch dated to the earliest phase of forge c1850s-1880s.
- K1.9* Enclosed arch that contained a steel-framed shed with steel-trussed roof and a travelling crane (**Plates 350 & 355-356**). The north of the

arch was closed in a primary stone wall with three steep buttresses. Both the shed and the travelling crane are shown on the 1923 Factory Plan (**Illustration 16**) and thought to date to c1915-1923. In 1923 the arch was depicted as open fronted being subsequently enclosed during the 1950s-60s.

K1.10 Partially enclosed arch containing free standing steel framed structure clad in corrugated steel sheet (**Plates 350 & 357**). The north of the arch was closed in a primary stone wall with three steep buttresses and upper blocked window. Structure comprised I-section iron columns with lightweight angle-iron fink trusses and dated to c1970s;

K1.11 The north of the arch was closed in a primary stone wall with three steep buttresses and upper blocked window. Internally contained no fixtures (**Plate 358**);

K1.12 The north of the arch was closed in a primary stone wall with three steep buttresses and upper blocked window. Internally contained no fixtures (**Plate 359**);

K1.13 Free-standing corrugated steel clad steel framed structure. Southern elevation contained wide opening flanked by steel framed multi-paned windows. K1.13 was of similar construction to that in K1.4 and believed to date to the same period of c.1970-75 (**Plates 360-362**);

K1.14 Partially enclosed arch with small square brick built structure in northwest corner dating to c1960s (**Plates 360 & 363**). Northern opening partially blocked with primary stonework with corrugated clear plastic cladding above; and

K1.15 Open arch containing brick built shed with pitched corrugated steel roof c.1914-23 (**Plates 360 & 364-365**). Internally the western wall had been rebuilt in blockwork, and a small blockwork office with continuous glazed southern wall. The roof was supported on a fabricated angle iron truss resting on RSJ wall plates on the east and west walls. The eastern third of the arch was partitioned by the eastern site boundary wall in order to accommodate a canal tow path.

Discussion: The arches beneath the River Aire viaduct would have initially been owned by the rail network responsible for its construction, with the arches individually let to accrue revenue. Initially the arches were occupied by several

other businesses and rail operators, with only a few rented by Monk Bridge Iron and Steel Works. By the mid 20th century the site had taken on all of the arches, with several containing buildings. Little remained of the early occupation of the arches, with the exception of the timber framed shed in K1.8 which was believed to date to the mid-19th century.

5 PHASED DEVELOPMENT OF STANDING BUILDINGS

The programme of standing building survey at the site of the former Monk Bridge Iron and Steel Works, latterly Doncasters examined structures that span across the whole period of use of the site from 1851 to 2006. Regrettably, the demolition and extensive alterations to many of the earlier buildings has resulted, at the time of survey, a group of inter-related structures that only provide an glimpse of each period of activity within the works. However, when they are examined in conjunction with historic mapping and documentary accounts a comprehensive picture of the former layouts and operational processes can be understood.

The approach adopted to address the varied dates of buildings that survived in 2006 was to consider the buildings in six phases of activity, each spanning twenty-five years from 1851 to 2006. The following section of this report briefly summaries each phase and are intended to provide an overview of the main changes that occurred within the Iron Side of the site, as the Steel Works was beyond the remit of the survey and very few structures remained standing from former operations.

5.1 Phase One (1851 to 1875)

The earliest structures surveyed would have formed part of the works established by Stephen Whitham in 1851 to supply high quality iron. The original extent of the early works was restricted to the eastern half of the plot that forms the present day site boundary, which at that date was traversed by a road known as the Holbeck pasture extension forming the western boundary of Whitham' s iron works.

Evidence from an oil painting dated to 1855 (see section 3.7 and **Illustrations 3-5**) depicts the works as viewed from the east bank of the River Aire, however, there are inconsistencies between the buildings represented in the painting and those shown on the two earliest maps, both dated to 1858

(Illustration 6). The painting is very instructive as it conforms to the appearance of a nineteenth-century ironworks, but it should perhaps be considered as representation of the early complex, rather than being 100% accurate. There are two large ventilated sheds with chimneys rising from the numerous internal furnaces and beyond, a third building, probably a rolling mill running at right angles to Whitehall Road. There is also a single storey range of buildings fronting Whitehall Road. Remnants of these original structures survive on the site particularly within the modified ground floor of the office range fronting onto Whitehall Road (building group A).

In 1854 Whitham's 'Monk Bridge Iron Works' was transferred to the ownership of James Kitson, who in turn passed the interests of the works to his two sons. The new ownership of the site coincided with renewed investment and by 1858, the expansion of the works in a westerly direction (**Illustration 3**). In 1864 land to the south of Whitehall Road was purchased to develop a steel production operation. Elements of the Whitehall frontage range are representative of the rapid expansion of the site westwards. This includes two cottages (building B2) adjacent to the main entrance and a large L-shaped shed (building E) situated slightly to the west, that operated as a tyre mill. Structural elements of this shed in the form of roof trusses and columns remain incorporated with later additions to the building (Building E1) and appear to correlate to features depicted on the painting of 1858. Two further buildings remain from this early phase of the works; a rectangular building (building B5) at the extreme western end of the site, running parallel to the Midland Railway, the smith's shop, and a timber framed shed (building K1.8) constructed beneath one of the arches of the River Aire viaduct.

5.2 Phase Two (1876 to 1900)

Further development at Monk Bridge came after the conversion of the Monk Bridge Iron and Steel Company into a limited company in 1886 (**Illustration 6**). The majority of the manufacturing facilities of the site were well established by this date, and thus the focus of attention for building activities appears to have been the office range along Whitehall Road, which was expanded and a new improved internal layout created that reflected the growing status of the company. This is confirmed by the size of the workforce which in 1887 totalled 700 men and the end of the century the works operated 4 rolling mill engines, 3 of 1000hp and 1 of 60hp; 30 engines of 4-30hp; 30 boilers with output of

c.1500hp; 14 steam hammers 6-15cwt size; and Siemens gas producers.

5.3 Phase Three (1901 to 1925)

The works appears to have always been at the fore-front technological developments in steel and iron production during the 19th century which continued in the early part of the 20th century. This is demonstrated by the massive investment in a huge tyre rolling plant, buildings I4, I4.1 and I4.2, in 1911 (**Illustrations 75 to 78**), the construction of which necessitated the demolition of the northern end of the existing rolling mill. A further large shed, building I2.2, was added soon after this probably whilst the works were under Government control during the First World War. Further smaller scale building programmes took place following the war including the addition of a second storey to building A2 at the eastern end of the existing 1851 range fronting on to Whitehall Road and the construction of a small two storey brick-built structure, building F1, close to the main entrance to the site. The original function of F1 is unclear, but it was latterly used as an ambulance room and laboratory. Two of the structures contained within the arches of the River Aire viaduct also date from this phase of the site and are both shown on the 1923 factory plan (**Illustration 16**). These are both steel framed sheds with steel trussed roofs.

5.4 Phase Four (1926 to 1950)

The period 1926 to 1950 (**Illustration 2**) saw little in the way of major structural development taking place to the north of Whitehall Road. For a proportion of this time the works was under the control of the Ministry of Supply and only two buildings appear to date from this period, I3 and I3.3. Both of these structures are large steel framed sheds that link activity between earlier buildings.

5.5 Phase Five (1950 to 1975)

After the end of the Second World War the fortunes of The Monk Bridge Iron & Steel Company went into decline and the works closed in 1949. It was reopened again in 1951 after being acquired by the Sheffield firm of Doncasters to manufacture forged turbine blades for jet engines. The take-over of the site by Doncasters coincided with renewed investment in the infrastructure, resulting in a programme of structural refurbishment and new

building on the site. A considerable amount of construction took place during this period the majority of which was carried out in a distinctive constructional style adopted by Doncasters.

5.6 Phase Six (1975 to 2006)

The buildings constructed during the final phase of development are predominantly a result of renewed investment in the site which took place in the late 1960s and early 1970s. These structures are connected with the installation of new plant and processes connected with the production of high quality turbine blade forgings for the aerospace and gas turbine industries, particularly building I5, which housed a massive 14,000 ton press and building D1 (The Concord Building) notable for its association with the design and testing of turbine blades for Rolls Royce Olympus engines.

6 SUMMARY

The Monk Bridge Iron and Steel Works was one of a small number of firms that provided high quality forgings that contributed to Leeds becoming one of the leading manufacturing cities associated with development of the locomotive industry during the latter part of the 19th century. The size, complexity and scale of the buildings that were constructed in the works confirm its prominence within the region, and by the 1900s was renowned as one of the market leaders.

The manufacturing buildings were essentially large open sided sheds with metal roofs and are typical examples of manufacturing shed from 19th century forges and iron works. Their principal function was to provide basic protection from the elements to the plant, furnaces and men, whilst facilitating the rapid dissipation of heat, vapour and steam. The use of cast-iron columns and wrought iron tie rods and struts demonstrates a sound understanding of the stresses and capabilities of these products, which were also far more resistant to the intense heat that would be generated from the puddling and forging processes than timber trusses, or posts.

This is especially apparent when considering the massive workshop spaces, or production sheds, both making effective use of the tensile strength of wrought iron as roof trusses and cast iron columns in compression to construct large and spacious buildings. The development of metal roofs for

fireproof mills is well established in Derbyshire and throughout the Pennine region, and the original sheds constructed at Monk Bridge clearly incorporate design elements from these contemporary structures. Interestingly however, as advances in steel production were being made, constructional techniques were soon to take advantage of its superior qualities demonstrated by the scale of the new tyre mill built in 1911 (buildings I4, I4.1 and I4.2).

The location of the works would have been fundamental to its rapid expansion in the latter part of the 19th century. Holbeck was the heart of the Leeds locomotive industry and the Kitson's forge not only had good access to the road network, it was directly linked to the national railway system immediately adjacent to the Leeds and Liverpool Canal system. Following the expansion of the site to the south of Whitehall Road, the internal rail network was integrated, thus enabling the flow of materials and products to be undertaken as efficiently as possible.

The subdivision of processes into separate iron and steel works on either side of Whitehall Road is likely to relate to both operational techniques, but also that the iron works was already well established when the steel side was built and the need to adapt the existing buildings was therefore not necessary. It is interesting however that no blast furnaces were ever built on the steel side, thus apart from the importation of raw materials and fuel both works were largely self sufficient in their operation needs.

This survey has challenged and refined previous interpretations of the site, most notably that building E1 was not the site of Kitson's earliest move into the production of crucible steel as previously believed. A much more efficient method of steel production was installed to the south of Whitehall Road in the 1880s and it is unlikely therefore that the interpretation of a small cluster of circles on the 1923 site plan (**Illustration 16**) as a crucible hearth utilising the 'Sheffield' method is correct.

At the turn of the last century the field of metallurgy was rapidly expanding, with many new discoveries and refinements being made and documented at individual factory sites. The 'recipes' and 'formula' for new alloys and processes were heavily guarded, and Monk Bridge clearly played a part in this 'metallurgical race' utilising advances in science and laboratory techniques that contributed to the long history of innovative engineering in the Holbeck area of Leeds.

The continued use of the site, undergoing numerous phases of reorganisation and use is reflected within the range of buildings that survive. None, however, can stand alone as being considered of national importance, although they were built at times of expansion and demonstrate technological achievement at the date of their construction. This is especially apparent when considering both the massive sheds and the alterations to the nineteenth-century offices, along Whitehall Road, whose external and internal appearance was enhanced to emphasize the growing success of the company.

Conclusion

It is recommended that a future phase of work should incorporate the results from the building survey with those of the archaeological excavations that took place on the site. This should consider not only technological changes, but the physical nature of process flow, which in turn may enable a greater insight into former working practices to be developed. The later developments made following the purchase of the works by Doncasters should also form part of the story of the site, although this is perhaps not as archaeologically significant as the remains from the 19th century, but still represents an important stage in the development of metallurgy associated with the aerospace industry. The relationship of works such as Monk Bridge with the supply of material and products for the government during periods of conflict may also be worth exploring. The capability of the works to deliver the quantity and quality of metal products for the ministry of supply is a testament to the continued skill and business acumen of both the owners and workforce throughout the first half of the 20th century.

This report should therefore be regarded as only part of the story of the former Monk Bridge Iron and Steel Works and when combined with the results from the excavations will no doubt refine our understanding of the former processes and present a series of plans depicting any changes in the manufacturing layout.

7 ARCHIVE

The project archive will be deposited with West Yorkshire Archives: Leeds. The archive will be prepared by ARCUS staff in accordance with the requirements specified in Management of Research Projects in the Historic Environment (English Heritage 2006b) and with UKIC guidelines (1990). In addition, copies

of this report will be deposited with the WYASS HER, circulated to the client, and retained in the offices of ARCUS.

8 ACKNOWLEDGEMENTS

The author would like to thank Rob Kinchin-Smith of RPS for arranging access to the site and HBG for commissioning ARCUS to undertake the survey. Staff of the local studies library and Sheepscar Archives in Leeds assisted in locating relevant background information. Helen Gomersall of the West Yorkshire Archaeology Advisory Service provided useful advice and information relating to the industrial development of Holbeck. Particular acknowledge should be made to Doncasters, who gave permission to photograph the historic painting of the works that currently hangs in their board room.

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Historic maps

- 1847 OS Map 50" to 1 mile, Sheet 14
- 1851 OS Map 6" to 1 mile (published May 1852)
- 1858 Masser' s Map 6" to 1 mile (Leeds City Library ML 1858)
- 1858 Davies' Map 6" to 1 mile (Leeds City Library ML 1858)
- 1864 Deed Map (Leeds District Archives WYL 342, Acc 1315)
- 1866 Brierley' s Map 6" to 1 mile (Leeds City Library ML 1866)
- 1881-2 Great Northern Railway Session, 12" to 1 mile (Leeds City Library ML 1882)
- 1890 McCorkindale' s Map 12" to 1 mile (Leeds City Library ML 1890)
- 1893 OS Map 25" to 1 mile, Yorkshire (West Riding) Sheet CCXVIII.5 (sur.1888-90)
- 1908 OS Map 25" to 1 mile, Yorkshire (West Riding) Sheet CCXVIII.5
- 1921 OS Map 25" to 1 mile, Yorkshire (West Riding) Sheet CCXVIII.5 (revised 1916)
- 1932 OS Map 25" to 1 mile, Yorkshire (West Riding) Sheet CCXVIII.5

1953 OS Map 1:1250, Sheets 2833SE and 2933SW (Revised Oct-Nov 1952)

1968 OS Map 1:1250, Sheets 2833SE and 2933SW (Revised Jan 1963)

1982 OS Map 1:1250, Sheets 2833SE and 2933SW (Revised 1977 and 1982)

Historic documents

Deeds in Leeds Archives, WYL 342, Acc 1351

Deposited building plans for the Monk Bridge Iron and Steel Works in Sheepscar archives, Leeds

Submitted building plans and engineering drawings retained within former drawing office of Doncasters, Monk Bridge, Leeds

10 ILLUSTRATIONS AND PLATES

APPENDIX 1: RPS/WYAAS SPECIFICATION

Specification for Building Recording

Doncaster' s, Monk Bridge Forge, Whitehall Road, Holbeck, Leeds

(NGR SE 2903 3307)

Specification prepared at the request of HBG Properties on behalf of Leeds City Council

1 Summary

1.1 A building record (drawn and photographic survey) is required to identify and document items of archaeological and architectural interest prior to the demolition of this 19th- and 20th-century engineering works. This specification has been prepared by RPS Planning and Environment, in conjunction with the West Yorkshire Archaeology Advisory Service, the curators of the West Yorkshire Sites and Monuments Record.

2 Site Location and Description

2.1 Location

The Site lies at NGR SE 2903 3307, roughly 1km south-west of the city centre. The site is situated in a formerly heavily industrialised area of Holbeck, on a plot of land bounded to the southeast by the Whitehall Road (the Leeds to Halifax turnpike), to the southwest by the embankments of the former Leeds & Bradford Railway, to the northeast by the River Aire and Leeds and Liverpool Canal, and to the northwest by the Grade II Listed River Aire viaduct that formerly accessed Leeds' now-demolished Central Station.

Throughout this document, a 'site north' is used, where the Whitehall Road is 'south', the railway embankments are to the 'west', the River Aire and Leeds & Liverpool Canal are 'east' and the Grade II Listed viaduct is to the 'north'.

2.2 Description

2.2.1 Building Group A – Whitehall Road Frontage (East)

Building A1

Last / Current Use: Training Room over access void (tunnel to southern site)

Known Historic Uses: Pattern Stores over void and Toilet (1880); Personnel Office over void (c.1957-64)

Build date: c.1851-c.1870, very substantially rebuilt c.1914-18.

Description: Small one-storey building measuring c.7mx6m, over large void and tunnel beneath Whitehall Road. Brick, with slate roof. South elevation: 3 window bays under sawn stone lintels, with chamfered sawn stone sills, 1 large door bay under concrete lintel (all windows and doorway blocked with modern brick). Pebble-dash rendered plinth. Square brickwork dentils under eaves. East elevation: 1 window under sawn stone lintel, with brick sill. Window blocked with modern brick. North elevation: 3 window bays and one door bay, all under concrete lintels, windows with brick sills. East window formerly door, shown as such on factory plan of c.1957-64. Evidence of much rebuilding. Modern door, timber window frames with timber transoms, mullions and casements. Except eastern window, all windows appear to date to early 20th Century. Square brickwork dentils under eaves. Welded steel external walkway.

Interior: Modern interior with no features of note visible.

Assessment: Much-rebuilt ancillary office with fragmentary remains from early ('dentillated eaves') phase (c.1851-70). Formerly part of longer range with Building A3. Location on eastern half of site and architectural style imply that the earlier fragments may date to Witham' s Forge of 1851-4 or to the early

Kitson period. Of lesser interest because of alterations and former ancillary use, but retaining some primary features, notably roof and dentillated brickwork under eaves. Style of dentils consistent with other buildings that appear to date to c.1851-c.1870. Shown on OS 1:500 plan of 1888-90. The void beneath this building was a tunnel under Whitehall Road. A building of minor local historic interest because of association with Witham's forge.

No known drawings survive, except various factory plans.

Building A2 & A2.1

Current / Last Use: Offices / Interview Rooms over 3-Phase Transformer Sub-Station & Store

Known Historic Uses: A2: On site of Stores and Pattern Stores (1880); 3-Phase Sub-Station (July 1944); Sub Power Station (c.1956); Transformer House (with offices / interview rooms over) (c.1957-64)

A2.1: Conference Room (c.1957-64); Stationary Store (c.1965-68)

Build date: A2: (parts) possibly c.1916-18 (Dated from A2.1 below), very heavily reconstructed in 1950s

A2.1 lower storey (parts) c1916-1918, upper storey 1950s (A2.1 not shown 1916 OS, first shown Jan 1923 Factory Plan)

Description: A2: Small two-storey building measuring c.12.5mx5.5m. Brick, with felted flat roof. South elevation: Single storey. 5 window bays under concrete lintels, with concrete sills, 1950s timber window and door frames with timber transoms, mullions and casements. Some brickwork may be early 20th Century, but building very heavily rebuilt in 1950s.

North elevation (A2.1): Two storeys, c.6mx3m. Brick, with felted flat roof. Two phases, both of 4 window bays with 1950s timber window frames with timber transoms, mullions and casements (as Bldg. A1), all under 1950s concrete lintels supporting brick soldier lintels, all with brick sills.

Interior: 4 'Projector Rooms' (empty) on lower storey. Upper storey 1950s sundry offices.

Assessment: Two-phase, flat-roofed building of lesser interest. Parts may date to Government operation of the site during the First War and may be contemporary with alteration of Bldg A1. Heavily rebuilt in 1950s. A building only of any interest due to its context.

Detailed 1950s (re)construction drawing survives on site.

Building A3 and A3.1

Current / Last Use: Workshop then Document Store

Known Historic Uses: A3: Warehouse (1880); Offices (July 1944); Blade Proofing Dept, Development Depot and Dark Room (c.1956); Blade Proofing, Blade Proofing and Projection Room (c.1957-64), lastly store.

A3.1: Blade Monitoring Dept (c.1956); Blade Monitoring (c.1957-64); Ladies Toilets (2002)

Build date: A3: c.1851-c.1870 (Land part of Witham's forge, constructed by 1880 deposited plan, early architectural style).

A3.1: c.1950s-1960s (Not shown 1953 OS, first shown c.1957-c.64 Factory Plan).

Description: A3: Single storey range measuring c.23mx6m. Brick, with slated roof. South elevation: Single storey. 5 window bays, with gable on 4th bay from W. Square brickwork dentils under eaves, stone string-course. Window openings appear primary, with stone sills but 4 have later concrete lintels. The window in the gable bay has stone transom and segmental brick head. Inserted timber window frames in all

window openings, with timber transoms, mullions and casements (probably contemporary with rebuilding of Building A4 in 1891). Brickwork and roof appear to date to c.1850-1880. North elevation: Single storey. 2 window bays, 1 (widened) double doorway, 2 primary door bays (blocked), with gable on 1st bay from W. Square brickwork dentils under eaves. Rendered over-all, including in 2 blocked doorways, scribed to resemble ashlar stonework. Window and door openings appear primary. Inserted timber window frames with timber transoms, mullions and casements again probably contemporary with rebuilding of Building A4 in 1891. Brickwork and roof appear to date to c.1851-1870.

A3.1: Single-storey, pent-roofed outshut, measuring 6mx2m. Brick with slate roof. North elevation, formerly four window bays, western pair blocked, with inserted door.

Interior: Fully plastered internally with no features of interest except two doorways with architraves matching examples in Building A4 (second storey) known to date to 1891.

Assessment: A3: Single-storey ancillary workshop range with architectural style consistent with other buildings that appear to date to c.1851-c.1870. Possibly original machine shop for turning rolls or pattern and joiners shops(?). Location on eastern half of site and style of dentils imply that this building may date to Witham's forge, but it might equally belong to the early Kitson phase (post 1854-c.1870). Shown on deposited plan of 1880. Replacement (1891?) windows and lintels, but retaining original roof and otherwise little altered externally. Interior retains little of historic note however. Moderate local / regional historic interest due to its context. A3.1: Altered, small, single-storey workshop extension of c.1950s-60s, of no architectural or historic interest.

No known drawings survive, except various factory plans.

Building A4, A4.1 and A4.2

Current / Last Use: Offices, Meeting Room etc

Known Historic Uses: A4: Offices (1891); Offices (July 1944); Switch Board, Strong Room, Office, C.W.O., M.I.Ord, Development Office, Gents Toilets (c.1956); Waiting Room, Purchasing, Development Office, Standards Room (c.1957-64); Canteen (2002)

A4.1: Waiting Room (c.1956); Switch Board (c.1957-64)

A4.2: Ladies Toilets and stair to basement (c.1956); Dark Room and stair to basement (c.1957-64)

Build date: A4: Ground Storey c.1851-c.1870 (Land part of Witham's forge, constructed by 1880 deposited plan; Upper storeys 1891, by Chorley & Connon (Deposited plan)

A4.1: c.1944-52 (Not shown 1944 Factory Plan, first shown 1952 OS)

A4.2: 1933-1944 (Not shown 1932-3 OS, first shown 1944 Factory Plan)

Description: A4: Two- and three-storey range (plus basement) measuring c.38mx8m. Brick in simplified Jacobean style, with terracotta detailing and slated roof. South elevation: 13 window bays, with gables (with ball finials) over bays 1-2, 8-9 and 13 (from W). Moulded terracotta window surrounds, voussoirs, copings to gables and ball finials. Generally unaltered apart from much replacement fenestration. Some original double-hung sashes survive however. Lower storey pre-dates remainder. Upper storeys and roof date to c.1891. West elevation: Painted and rendered, The building formerly extended over the main entrance to the site, but this was removed when the entrance was widened sometime after 1982. North elevation: Irregular bay structure. Centre section of elevation breaks forward with inset loading bay at ground floor, with weather-boarded second storey over. More perfunctory detailing than south elevation, but some parts have saw-tooth brick detailing under eaves (as Bldgs B3 and B4). Little altered, but with replacement fenestration to third storey.

Interior: Much altered and modernised. Generally few features of note apart from joinery in entrance lobby, staircase (with full-height primary decorative glazed ceramic tiles and cornice and several primary doorways with architraves. Second storey offices include James Kitson's and Director's offices, with safe and deep skirting boards. Deep decorative cornices survive behind suspended ceilings. Generally much altered however, with inserted partitions etc.

A4.1: Small two-storey bay measuring c.4mx1.6m, added to western end north elevation, bringing it forward to line of remainder of the elevation. Large areas of fenestration with timber transoms, mullions and casements, breaking forward from original gable over. Brick with flat roof, upper storey rendered. Visually appears to date to c.1916-23, but not shown on 1923, 1932 or 1944 maps or plans. First appears as Waiting Room on Factory Plan of c.1956. Interior combined with Bldg. A4.

A4.2: Small single-storey, brick-built flat-roofed staircase lobby with staircase, measuring c.6mx2m. Two large rectangular timber windows with timber transoms and mullions. Built between 1944 and c.1956. Interior combined with Bldg. A4.

Assessment: A4 / A4.1 / A4.2: 19th-century office block. Early lower storey, with upper storeys added in 1891 by Chorley & Connon, designed in simplified Jacobean style. Contained Counting House, Forge Offices, Clerks', Engineers' and Sir James Kitson's offices. The saw-tooth dentillation under the eaves on the north elevation is similar to Bldgs B3 and B4. Little-altered externally, but with some refenestration. Some features of minor architectural note internally. A building of some architectural merit and local historic interest due to its context.

Original construction drawings survive in Leeds City Archives. Later drawings showing A4.1 prior to creation of modern entrance survives on site.

Building Group B – Whitehall Road Frontage (West)

Building B1

Current / Last Use: Waiting Room (W.), Security Office and Reception (E.)

Known Historic Uses: Main Offices (c.1900 description); Time Office (1911 Deposited Plan); M. Platt (W.), Wages Office (E.) (c.1956); O. Dennis (W.), Security Office (E.) (c.1957-64).

Build date: c.1854-c.1870 (Land not part of Witham's forge, but building shown on 1880 Deposited Plan). Early architectural style).

Description: Truncated two-storey building (plus basement) measuring c.7mx6m. Formerly 17mx6m including demolished entrance archway to east. Brick, with slated roof. South elevation: 3 window bays, with primary openings under rubbed brick segmental heads. Modern replacement fenestration to ground storey, modern replacement double-hung sashes to second storey. Straight structural joint to west, implies that this range pre-dates Bldg. B2 adjacent. Square brickwork dentils under eaves. Continuous stone sills forming upper and lower string-courses. North elevation: 2 primary doorways under rubbed brick segmental heads and inserted eastern bay window to ground storey. Two primary windows under rubbed brick segmental heads (one blocked) to second storey. Square brickwork dentils under eaves. 1 primary stop-chamfered 4-panel door with louvred vent over survives on ground storey. Surviving upper window (with bottom-hung upper light) may also be original. The semi-circular projecting bay window on the ground storey has chamfered stone mullions, sills and heads and 3 double-hung primary sashes, under a flat roof. This bay window appears to date to c.1900 and is first shown on a Factory Plan of Jan 1923. East elevation: Painted and rendered modern brick. This range formerly continued further east to include an arch over the main entrance to the site, but this part was demolished when the entrance was widened sometime after 1982.

Interior: Generally much altered, with some partitions removed and others and suspended ceilings inserted. Few surviving features of note visible excepting primary staircase (with primary softwood panelling) and

some door architraves etc on second storey.

Assessment: Truncated two-storey office range, with basement. Style of dentils consistent with other buildings that appear to date to c.1851-c.1870, but this building cannot date to before 1854 as the land here was not part of Witham's forge. Shown on OS 1:500 plan of 1888-90. Some surviving primary windows and doors, retaining original roof and otherwise little altered externally. Interior appears to retain little of note however. This building is of some historic interest as a surviving part of the former main offices apparently built soon after the Kitson take-over of the site (1854-c.1870). Its interest is reduced because of its truncation, internal alterations and likely former ancillary use. A building of some local historic and architectural interest, due to its context.

Detailed drawing showing complete building prior to creation of modern entrance survives on site.

Building B2 and B2.1

Current / Last Use: Surgery, Stores, Offices; Offices and Drawing Office over

Known Historic Uses: B2: Two Cottages (1911 Deposited plan); Master Die Production Dept (Fitters) and CMT Template Filer (c.1956); Central Works Offices (c.1957-64).

B2.1: Stairs (c.1930s); Toilet and Store (c.1956 and c.1957-64).

Build date: B2: c.1854-c.1870 (Land not part of Witham's forge, but building shown on 1880 Deposited plan. Early architectural style).

B2.1: c.1880s(?) (building shown on 1888-90 OS 1:500 map, later-19th-century architectural style)

Description: B2: Two- and three-storey building (plus basement) measuring c.14.5mx6m. Brick, with slated roof. South elevation: two storeys, with flat-roofed secondary third storey to west and primary gable to third storey to east. 6 window bays, with primary openings under rubbed segmental heads. Some primary fenestration survives. Westernmost two windows on second storey blocked with modern brick, central two windows on second storey have replacement concrete lintels. Straight structural joint to east, implying that this range post-dates Bldg. B1 adjacent. Bldg. B3 to west is clearly later. Square brickwork dentils under eaves, excepting secondary flat-roofed third storey to west, which has simpler segmental brick head. Continuous stone sills forming upper and lower string-courses, as Bldg. B1. North elevation: two storeys, with flat-roofed secondary third storey to west and primary gable to third storey to east. 6 window bays, but western two obscured by abutting Bldg B2.1. All primary openings under rubbed brick segmental heads. All windows and ground-storey door are secondary, except double-hung sashes to third storey eastern gable. Straight structural joint to east, implying that this range post-dates Bldg. B1 adjacent. Bldgs B2.1 and B3 to west are clearly later. Square brickwork dentils under eaves, excepting secondary Bldg B2.1 flat-roofed third storey to west, which has simpler segmental brick head.

B2.1 Small, three-storey, brick-built, hipped-slate-roofed annexe, abutting the north side of Bldg. B2, originally containing a staircase. Ground plan measures c.4mx3.5m. Sawtooth brick dentillation below eaves, implying construction date c.1880-90, as Bldgs A4, B3 and B4. North elevation: Ground storey - two primary doorways with segmental brick heads, lower parts blocked to form windows post-c.1957-64; second storey - one large window and I small window, both primary with segmental heads, both blocked with modern brick; third storey - primary window reformed at higher level with modern brick but reusing primary stone sill. East elevation: Ground storey - two doors, one small primary door with segmental head, I large inserted doorway with concrete lintel and scars showing former small 'Tea Masher' annex shown on plans c.1956, c.1957-64 and 1975; second storey - large inserted 'picture window' under concrete lintel; third storey - reformed window under reformed segmental brick head with concrete sill.

Interior (B2 and B2.1): Generally much altered, with stairs and some partitions removed and others and suspended ceilings inserted.

No historic internal features visible, except 1950s Optical measurement machine.

Assessment: B2: Two- and three-storey cottages, later office / ancillary workshop range. Style of dentils consistent with other buildings that appear to date to c.1851-c.1870, but cannot date to before 1854 as the land here was not part of Witham's forge. Similarity of stone string-courses and rubbed brick window heads imply a date very close to Bldg. B1 to east. Some surviving primary windows, retaining original roof and generally little altered externally, excluding added third storey at western end, which is contemporary with Bldg B2.1(below). Interior retains little of note however. This building is of some historic interest as it was apparently built soon after the Kitson take-over of the site (1854-c.1870). A building of some minor local historic and architectural interest, due to its context.

B2.1: Much altered three-storey former stair tower, dated to later Kitson period (c.1880) by saw-tooth dentillation and plain segmental heads over windows. Much altered through removal of staircase, re-fenestration and incorporation into Bldg. B1. A secondary extension to the former main offices, of lesser historic or architectural importance.

Detailed construction drawings of Building B2 dated 1911 survive in Leeds City Archives.

Building B3

Current / Last Use: Auxiliary Die-Milling Machine Shop; Quality Control labs over

Known Historic Uses: Fitting Shop (Deposited plan of 1888); Machine Shop for tool-making and turning rolls, with pattern and joiners shops over (Description c.1900-05); Ditto (1923 and 1930s Factory Plans), Joiner's Shop with Canteen over (1941); Joiner's Shop (1944); Die Milling Dept, Stores and Office (c.1956); Die Milling Dept (Staff Canteen Over) (c.1957-64); High Speed Milling Support Cell (2002).

Build date: c.1870-80 (Building shown on 1880 Deposited plan. Later architectural style).

Description: Large two-storey workshop building measuring c.20mx9m. Brick, with slated roof. South elevation: 7 window bays, with openings alternating on each storey between round-headed and segmental brick heads. Upper round-headed windows break eaves line, in semi-circular dormers. Modern replacement fenestration to all windows. Stone string courses and sills, with saw-tooth brick dentillation under eaves and upper string course. Straight structural joints to east and west, implying that this range pre-dates Bldg B4 and post-dates Bldg. B2 adjacent. North elevation: 3 window bays to either side of central bay with central gable over large doorways to ground and second storeys (upper opening reduced to window). Segmental brick heads, stone sills, saw-tooth brick dentillation. One lower window opened into doorway post-c.1956. Some primary fenestration.

Interior: No surviving features of note visible. Until recently the first (ground) storey contained modern computer-driven milling machinery for producing forging dies, although all have been removed.

Assessment: Generally well-preserved ancillary machine shop, originally with joiner's / pattern-makers shop (canteen from 1941) over. Well-designed, with some architectural pretensions, probably dating to late 1870s. Modern floor coverings / concrete screed / wall and ceiling finishes obscure evidence of former uses or sites of machinery. The building now retains nothing little of interest internally. This building is of some historic interest as a well-preserved workshop building dating to the Kitson period. A building of moderate local / regional historic and architectural interest individually and because of its context.

Detailed drawings of 1941 survive on site

Building B4

Current / Last Use: Main Die-Milling Machine Shop; Quarantine and Testing (later stores?) over

Known Historic Uses: Tool Shop (1888 Deposited plan); Machine Shop for tool-making and turning

rolls, with pattern and joiners shops over (Description c.1900-05); Ditto (1923 and 1930s Factory Plans), Electrician' s and Fitter' s Shop (1944); Machine Shop (Canteen over) (c.1956); Ancillaries Dept (Works Canteen Over) (c.1957-64); High Speed Milling (2002).

Build date: c.1880-88, on site of earlier stable (Building not shown on 1882 map, shown on 1888 Deposited Plan of 1888. Later architectural style).

Description: Large two-storey workshop building measuring c.29mx13m. Brick, with slated roof. South elevation: 8 window bays, with openings with segmental brick heads. Primary fenestration to much of upper second storey, modern replacement fenestration to ground storey. Stone string courses and sills, with saw-tooth brick dentillation under eaves and upper string-course. Westernmost second-storey window originally a taking-in door to street, lower part carefully infilled with modern brick and stone sill to match remainder. Straight structural joints to east, implying that this range post-dates Bldg. B3 adjacent. North elevation: Only five bays visible, because the westernmost three bays are abutted by Bldg. B5. Saw-tooth brick dentillation under eaves, windows with segmental brick heads, with stone sills. Primary window openings and fenestration survive in bays 5 to 8 (from west) on the second storey, with the former window in bay 4 infilled with modern brick and inserted fire-escape doorway. On the ground storey there is a large primary doorway in bay 5 (formerly rail-accessed), with primary window openings (with replacement fenestration) to bays 6 to 8 (from west). The window in bay 6 has had a door inserted post-c.1956.

Interior: No surviving features of note visible. Inserted modern concrete floor to second storey supported on rolled steel joists. Until recently the first (ground) storey contained modern computer-driven milling machinery for producing forging dies, but these have been removed.

Assessment: Generally well-preserved ancillary machine shop and joiner' s / pattern-makers shop. Well-designed, but with fewer architectural pretensions than Bldg. B3, probably dating to c.1880-88. Modern floor coverings / concrete screed / wall and ceiling finishes obscure evidence of former uses or sites of machinery. The building now retains little of interest internally. As with Bldg. B3, this building is of some historic interest as a well-preserved workshop building dating to the later Kitson period (1880). A building of moderate local historic interest individually and because of its context, but of lesser architectural or historic interest than Bldg. B3.

Detailed drawings (undated but probably c.1920s-40s) survive on site

Building B5

Current / Last Use: Bar Stock Store and Shears

Known Historic Uses: Smith' s Shop (Deposited plan of 1888); Smith' s Shop (carriage and wagon axles), containing 3½ ton steam hammer and 2 Siemens gas furnaces (Description c.1900-05); Ditto, with cranes and hearths shown on 1923, 1930s and 1944 Factory Plans); Ditto with larger furnaces and 15 and 30 cwt hammers (c.1956); 30 cwt Forge (1964); Smith' s Shop, with partitioned-off Grinding Dept at S. end (c.1957-64); Bar Stores (2002).

Build date: Southern 7 bays by 1882 (clearly shown on Great Northern Railway map of 1882), possibly c.1860s (possibly shown on Brierley map of c.1866). Northern 3 bays (shown open-sided to after 1932 OS map) added in 1888 (Deposited plan). Current exterior walls added 1964, in Doncaster' s house-style (plans extant on site)

Description: Large double-height, single-storey workshop building measuring c.36mx15m. Modern brick construction with tall parapets concealing pitched roof behind. East elevation: Modern brick pier-and-panel construction, with steel-framed windows with protruding concrete surrounds in Doncaster' s house-style. 10 window bays, large central doorways to 5, smaller double doorways to bays 2 and 7 (all from south). West elevation unrelieved except for high-level steel-framed windows; north elevation unrelieved

except for a large central doorway with protruding concrete surrounds.

Interior: No surviving historic features of note, excepting roof. The building retains its original wrought-iron trusses throughout, with angle-iron principal rafters and diagonals, with bar-iron verticals and ties with forged knuckles. These roof trusses are contemporary with, and of similar construction to, those surviving within Bldgs. E1, G1.1 and possibly I.1.

Assessment: Apparently a modern building, but concealing an intact 19th-century wrought-iron forge roof, with detailing identical to other wrought-iron roofs on site (Building E1 (1861), G1.1 (pre-1879) and G1 (1879)). Modern concrete screed obscures any evidence of former machinery and there is no visible evidence of the original external walls, although it is possible that original columns might survive within the wall thickness. The roof may merit recording along with other iron roofs on the site (e.g. Bldgs E1, G1.1 and fragments within G1) as an illustration of mid-19th-century engineering shop roofing practice. This building is of some historic interest for having an iron roof dating to the earlier Kitson period (1854-c.1870). Apparently an altered building of moderate historic and technical interest individually and in its context because of its roof. Its interest would be enhanced if any original columns survive buried within its external walls.

Detailed construction drawings showing the 1888 extension survive in Leeds City Archives

2.2.3 Building Group C1 and C1.1 – Welfare Facilities

Current / Last Use: Out of Use

Known Historic Uses: C1: Works Women' s Toilets (c.1957-64); Ladies (2002).

C1.1: Women' s Cloaks and Ambulance Block (c.1957-64)

Build date: C1: c.195(7)? (Immediately pre-dates C1.1, below)

C1.1: c.195(7)? (Dated from date numbering applied to building, but last digit missing)

Description: C1: Small single storey building measuring c.9mx6m. Brick, with low parapet obscuring concrete roof. East elevation: Unrelieved except for doubledoorway with protruding concrete surrounds in Doncaster' s house-style; north and west elevations unrelieved except for small steel-framed windows with protruding concrete surrounds.

C1: Small single storey building measuring c.8mx14.5m. Brick, with, with low parapet obscuring concrete roof. East elevation: Eight bays, each with steel-framed windows with protruding concrete surrounds in Doncaster' s house-style, except bays 2 ('Surgery') and 7 (Women' s'), which have double doorways with concrete surrounds. Enamelled cast brass numerals '195- ' applied at centre. South and west elevations unrelieved except for small steel-framed windows with protruding concrete surrounds. Phasing clearly implies that C1.1 post-dates C1.

Interiors: Unaltered interiors to both, with original partitions, doors and sanitary fittings, but stripped of medical fittings.

Assessment: Welfare block of two closely dated phases c.1957, built in Doncaster' s house-style. Unaltered but stripped of medical fittings and of interest only as an example of improved welfare facilities, especially for women. A building of only local interest at best, and that only because of its context.

Detailed construction drawings survive on site.

2.2.4 Building D1 – The 'Concorde Building'

Current / Last Use: Hollow Blade Finishing and Calibration Unit; Design Office, Accounts, Sales and Personnel over

Known Historic Uses: Known as 'the Concorde Building', constructed for developments associated with Rolls Royce Olympus engines.

Build date: c.late 1960s

Description: Large, modern 2-storey, flat-roofed workshop with offices over, measuring c.23mx38m. Externally expressed concrete frame of 7 bays length, unrelieved brick elevations to N. and S. Continuous, metal-framed fenestration between exposed concrete verticals, with brick below on ground storey and with profiled cladding above and below on second storey.

Interior: Ground storey – large workshop area with spinal row of columns, with partitioned areas for offices and Calibration Unit. Machinery removed. Upper storey – offices (largely open-plan). Both storeys little altered from new.

Assessment: Modern workshop and new offices of little architectural note, but of some historic significance because of association with development of civil jet and supersonic passenger air travel. Representative of the expansion and modernisation of British engineering at the close of Harold Wilson's 'white heat of technology' period.

Detailed construction drawings are likely to survive on site.

2.2.5 Buildings E1 and E1.1 – Former A Shop

Current / Last Use: E1: Compressor Blades - Heat Treatment, Inspection and Packing; Nickel Plating and Polishing Line

E1.1: Chemical Machining

Known Historic Uses: E1: 1861 Probable crucible steel plant and tyre forge with stores and engine houses; Stores at southern end and Engine House at northern end (Deposited plan of 1911); Forge (1923 and 1930s); Forge (with very little equipment surviving and Stores at southern end (1944); A SHOP - Inspection, Rectification, Turbine Blade Grinding Dept, Buffing Dept, Light Machine Shop, Turbine Blade Use Dispatch, Comparator Dept, General Store, Instrument stores (south end), Electro-polish, -strip and -plate, Comparator Dept (c.1956); A SHOP - Inspection, Rectification, Hollow Blade Inspection, Buffing Dept, Slug Radiac Machine Shop, Use Buffing, Instrument stores (south end), Nimonic and Chromic Electro-Chemical Shop, Comparator Dept (c.1957-64)

Build date: E1: 1861 (date-stone on east gable)

E1.1: 1975-82 (1975 Factory Plan and 1982 OS)

Description: E1: Large 3-aisled shed, with central aisle measuring c.13.5mx47.5m and side aisles measuring 5.5mx47.5m (west) and 5.5mx22m (east aisle truncated at south end by Bldg.E1.1). Formerly L-plan steel plant and tyre mill. North end removed. Formerly largely open-sided building, with cylindrical cast-iron columns, with brick-walling Stores at south end, two engine houses with water-towers over and eastern and western gables, one of which survives with 1861 date stone date and hanging ram plaque. The brick-walled Stores at the south end was incorporated into the remainder of the building between 1944 and 1956, with a steel truss replacing the dividing wall. The formerly open-sided parts of the western elevation are now infilled with 1950s/1960s brick pier-and-panel curtain walling, with steel-framed windows. The roof of central aisle is raised above the level of side aisles roofs on longitudinal primary lattice (and plate) girders, supported on cylindrical cast-iron columns. The southern half of the eastern aisle has been replaced by Bldg. E1.1. The roof of the southern bay of the western aisle has also been replaced. The roof cladding is generally modern and the southernmost bay is now the only part with a vented central 'hot-work' clerestory roof section.

South elevation: large primary central brick gable, flanked by two contemporary smaller gables. 3 primary

tall round-headed window openings to central gable, with stone sills and later brick infill and fenestration. Primary clerestory gable over, with circular oculus. Original stone copings replaced in modern brick. Flanking gable to west has tall, round-headed blind arch with primary window inset, whilst east flanking gable has former round-headed blind arch, opened into large doorway. Original stone copings to both flanking gables also replaced.

West elevation: 1 bay of primary brickwork at south end, with primary round-headed large doorway and primary window with segmental brick head and stone sill. Rounded corners to north and south show this was full extent of original walling. To north are two phases of post-1950s / 1960s curtain walling, then at north end the lower two storeys of a primary brick engine house / water tank, with boarded-up upper window opening under chamfered stone lintel and stone sill.

East elevation: 1 bay of primary brickwork at south end, with primary round-headed large doorway with two phases of modern brick infill and modern door. Beyond this the original columns have been removed by the construction of Bldg. E1.1, but to north of E1.1 the original brick eastern gable survives, with large central round-headed doorway (blocked), primary stone corbels and coping, 'hanging ram' emblem and 1861 date-stone. To the north of this point an original circular (formerly external) cast-iron column survives, and to the north corner a further primary brick engine house / water tank survives.

North (internal) elevation: Secondary (1950s/1960s?) brick walling between the two engine houses, with three large openings. Roof formerly continued past this point.

Interior: Little of note, excepting the mid-19th-century structural elements, including columns, longitudinal lattice and plate girders and wrought-iron trusses with angle-iron principal rafters and diagonals, bar-iron verticals and ties, all with forged knuckles. These structural elements are roughly contemporary with, and of identical construction to, those surviving within Bldgs. B5 and G1.1.

E1.1 Modern section, replacing original southern half of eastern aisle. New brick eastern wall with modern pent roof supported on rolled steel joists. No other features of note.

Assessment: Building E1.1 is of no technical or historic interest. Building E1, known as 'A Shop' in the 1950s and 60s, is of much greater interest however. In spite of later infill curtain walling, the truncation of its northern end, and the replacement of the southern half of the eastern aisle and part of the roof of the western aisle, this 1861 building remains a relatively well preserved example of a large mid-19th-century engineering forge / crucible steel shop. Currently several similar buildings employing similar constructional techniques as said to survive at other locations in Lancashire and Yorkshire,¹ but this number is decreasing rapidly year-on-year. The building would be regarded as being of high local historic significance because of the importance of the Monk Bridge forge and the Leeds engineering industry. In terms of its constructional detailing, its structural ironwork is identical to that in Buildings B5 (pre-1882 and 1888), G1.1 (pre-1879), and to fragments in G1 (1879). These roofs form part of a cannon of buildings nationally that have iron frames and roof trusses of technical interest in the development of iron and steel framed buildings. Whilst too altered and of insufficient interest to merit Listing, it would be likely to be considered to be of adequate historical and technical interest to merit further recording.

No known drawings survive, except various factory plans.

Buildings Group F

Building F1

Current / Last Use: Laboratory; Maintenance and Operations Offices over

¹ *Pers. Com.* Ron Fitzgerald

Known Historic Uses: Laboratory; Ambulance (1944); Laboratory, Clinic, Ambulance Room and Experiment Electro-Chem Lab (c.1956); Laboratory (1957-64)

Build date: c.1916-1923 (probably 1916-18)

Description: Small 2-storey, brick-built building with hipped slate roof to southern half and flat roof to northern half. c.9.x9m, with angled corners. 2 window bays to south elevation, with one window bay to each angled corner. Original fenestration to several windows, with openings with brick sills and chamfered stone heads. East and west elevations are of 4 bays, although there is a structural joint at the mid-point, indicating that the upper storey was originally of only 2 bays, with a length of 5m. The northern two bays of the upper storey appear to date to the 1950s or 1960s

Interior: No historic features on note except primary staircase.

Assessment: Attractive laboratory building, probably built during the First War. Indicative of the need for constant development and quality control needed for the Monk Bridge forge to maintain and improve the quality of its products. A building of local historic significance because of its context.

Apart from various factory plans, no detailed drawings have yet been found.

Building F1.1

Current / Last Use: Logistics

Known Historic Uses: None (probably laboratory extension)

Build date: c.1957-1968

Description: Small 2-storey, brick-built infill building, measuring 9mx3m, with one window bay per storey. Flat roof behind low parapet.

Interior: No historic features on note.

Assessment: 1950s/60s infill building in Doncaster' s house style. Of no apparent historic or technical interest.

Apart from various factory plans, no drawings have yet been found.

Building F1.2

Current / Last Use: Locker Room, Male and Female Toilets, Showers.

Known Historic Uses: As above (c.1956 and c.1957-64)

Build date: 1956 (Dated from date numbering applied to east elevation)

Description: Two storey brick building, measuring c.9mx13m, in Doncaster' s house-style. Flat roof behind low parapet. East and west elevations: 7 bays of which 5 are fenestrated, with blind bays at each end. Inserted door and window at south end of east elevation. Enamelled cast brass numerals '1956 ' applied at centre of north elevation.

Interior: Generally little-altered interior, with original partitions, cubicles and lockers.

Assessment: Welfare block of 1956, built in Doncaster' s house-style. Little altered internally or externally. Of some interest as an example of improved post-war welfare facilities for men and women, redolent of similar pre-war buildings at coal-mining sites. A building of only local interest at best, and then largely only because of its context.

Detailed construction drawings survive on site

2.2.7 Buildings Group G – Former C Shop

Building G1

Current / Last Use: Large Blades - Chemical Machining and Electro-Plating Lines

Known Historic Uses: Roof over Straightening Plate 14" Mill (1879 Deposited Plan); Puddling Furnaces and Forge (1923); Not shown (out of use) (1930s); No machinery shown (out of use) (1944); C SHOP - Brinell Dept, Barrelling Dept, Vapour Blast Dept, Cold Trimming Dept, Hot Straightening Dept, Hand Straightening Dept (c.1956); C SHOP - Large Blades Electro Chemical (Anodising, Nitric Strip, Chromic, Nimonic and Ferric Sulphate lines) (c.1957-64)

Build date: Minor fragments of c.1851 and 1879, mostly 1952-c.1957-64 (c.1957-64 Factory Plan)

Description: Large single-storey shed, measuring c.15mx25m. Formerly a largely open-sided forge building constructed 1879, abutting the eastern side of Witham's 1851 rolling mill. This range was built to house Straightening Mill associated with adjacent Puddling Furnaces and Rolling Mill (demolished). It was extended to meet Building A4 later in 1879. Between 1952 and c.1957-64 it was cut back again, widened, walled in, and the current south gable was constructed. It has since been wholly re-roofed, removing almost all of the pre-1950s structure.

South elevation: large central 3-bay brick gable, flanked by a flat-topped single bay to each side. Central gable has a tall central round-headed blind arch with projecting double doorway and blocked window over, flanked by blind opening to either side. Flanking bays each have a large steel-framed window with brick soldier lintels and brick sills. All constructed in 1950s, all in Doncaster's house style, but incorporating 1879 column and fragment of lattice girder and fragment of possible 1851 plate girder.

East elevation: 2 1950s brick pier-and-panel bays (each with 2 steel-framed windows) to either side of 3 large modern inserted large doorways. Windows in northernmost bay infilled with modern brick.

West elevation: 1950s brick pier-and-panel bays, each with 2 steel-framed windows excepting bays 1 and 9 where the windows are blocked with modern brick.

Interior: Nothing of note. Roof is of modern steel portal-frame construction, although there is a surviving 1950s steel truss at the southern end. All equipment and machinery has been removed.

Assessment: Apart from the fragments of historic structural ironwork in its south elevation, Building G1 is only of historic or technical interest because of its context as one of the later production buildings associated with Doncaster's modernisation of the site in the 1950s. The southern gable is of some interest because of the fragments of surviving 1851 and 1879 structural ironwork, whose detailing is generally identical to that found in Building B5, E1 and G1.1.

Detailed construction drawings of 1879 survive in Leeds City Archives.

Building G1.1

Current / Last Use: Large Blades - Nickel Strip

Known Historic Uses: Shown as part of Rolling Mills / Puddling Furnaces (Deposited plans and maps to 1923) Not shown (out of use) (1930s); No machinery shown (out of use) (1944); Finishing Dept and Wild Barfield Furnace (c.1956 and c.1957-64)

Build date: pre-1879

Description: Single surviving bay (measuring c.10mx8m) of a largely open-sided forge building constructed pre-1879, between the eastern side of Witham's 1851 rolling mill and the western end of the sheds over the puddling furnaces of Witham's forge. Retains cylindrical cast-iron columns and wrought-iron trusses. These latter have angle-iron principal rafters and diagonals, bar-iron verticals and ties, all with forged knuckles. These share apparently identical construction details to those within buildings B5, E1 and

G1. All equipment and machinery has been removed.

Assessment: This surviving early fragment of roofing is of interest because, together with fragments incorporated into the south gable of Bldg. G1 (above), it comprises the last surviving visible fragment of the historic puddling plant and rolling mills of the Monk Bridge Forge. It would be regarded as being of historic significance because of the importance of the Monk Bridge forge and the Leeds' 19th-century engineering industry. In terms of its constructional techniques, it apparently shares identical construction details with Buildings B5, E1 and G1. It forms part of a canon of buildings nationally that have iron frames and roof trusses of technical interest in the development of iron and steel framed buildings. It is considered to be of adequate historical and technical interest to merit recording along with the other early iron roofs on the site.

No detailed drawings appear to have survived, excepting various factory plans.

Building G1.2

Current / Last Use: Large Blades – Shot Blast and Dressing & Binding

Known Historic Uses: Large Blades - Use Grinding (c.1956)

Build date: c.1940s-1950s?

Description: Single roof bay measuring 13mx8m, with steel stanchions and fabricated steel trusses. These latter have angle-iron principal rafters, diagonals, verticals and ties, all with bolted steel gusset plates to junctions. Brick south wall matches the 1950s walls of Building G1.

Assessment: All of this building probably dates to the 1950s or 1960s, although its roof could date to any time after c.1914. Its only interest is that its height, width and pitch may preserve those of Witham's 1851 rolling mill, which was partly on this site.

Apart from various factory plans, no detailed drawings of this range have yet been identified.

Building G1.3

Current / Last Use: Effluent Plant

Known Historic Uses: None

Build date: post-1982

Description: Large modern rectangular building measuring 8mx24.5m. Profiled metal cladding with large effluent tanks on roof.

Assessment: Very modern building of no historic interest, apart from as an element of the overall site. Most equipment removed

Detailed construction drawings are likely to survive on site.

2.2.8 Building Group H1, H1.1, H1.2, H2 and H2.1 – Former D Shop

Current / Last Use: H1, H1.1, H1.2: Large Blades – Heat Treatment, Profile Analysis, Metrology, Inspection and Packing

H2: Large Blades – Gloup Stamps

H2.1: Large Blades - Offices

Known Historic Uses: H1: Tyre Shop (1957 drawing); H1: D SHOP - Hot Straightening Dept (Hand Straightening and Heated Die Straightening Dept) (c.1957-64)

Build date: H1: 1957(Dated from date numbering applied to building)

H1.1: 1964 (Dated from date numbering applied to building)

H1.2: 1965 (Dated from date numbering applied to building)

H2 and H2.1: 1965-8 (Post dates Bldg. H1.2, but constructed by 1968 OS)

Description: H1, H1.1 and H1.2: Large modern workshop building, measuring c.23mx33m. 9-bay brick pier-and-panel construction in Doncaster' s house-style to east and west elevations, with steel-framed windows and tall parapet obscuring 9-bay north-lit roof. Enamelled cast brass numerals '1956', '1964' and 1965' applied to west elevation. North and south elevations of profiled cladding, each with a deep band of continuous steel-framed fenestration. Light-weight construction allowed for further extensions. Large interior space without intermediate roof supports.

H2 and H2.1: Long, single-storey infill range, measuring 4mx31m.

Interior: All machinery and equipment has been removed, excepting two press furnaces.

Assessment: H1, H1.1 and H1.2: Multi-phased workshop range, built in Doncaster' s house-style. Structurally unaltered and well maintained. Of some historic interest for association with jet-turbine production in the 1950s and 1960s, although it appears that the earliest phase was built as a tyre shop. All equipment removed.

H2 and H2.1. No technical or historic interest, apart from in the context of the site as a whole.

Detailed construction drawings for first phase (H1) survive on site.

Building Group I

Buildings I1 and I1.1

Current / Last Use: I1 and I1.1: Store

Known Historic Uses: I1: Probable Tyre Mill, formerly part of L-plan steel works / tyre mill range with Building E1; Forge (1923, 1930s and 1944); Ruin (shown roofless) (1953 OS); West Inspection Dept (c.1956); North Inspection – Final Inspection Compressor Blades and Final Inspection C/L Blades; Dispatch (c.1957-64)

I1.1: Crack Detection - Compressor Blades and C/L Blades (c.1956 and c.1957-64)

Build date: I1: 1858-64 (first shown on Brierley map of c.1866)

I1.1: 1951-53 (First shown on 1953 OS map)

Description: I1: Truncated double-height range, originally westernmost end of L-plan steel works / tyre mill plant. Formerly largely open-sided forge, with cylindrical external cast-iron columns on north and south elevations, originally with brick curtain walling only to west elevation and the westernmost bays of east and west elevations. Whilst the original brickwork of the end gable survives, it appears that the original roof does not survive. The formerly open-sided south elevation is now infilled with 1950s/1960s brick pier-and-panel curtain walling, with steel-framed windows.

West elevation: large primary brick gable, with 3 primary tall round-headed openings with cast iron keystones. Openings infilled to half height with rendered brick, with steel-framed windows above. Original stone copings replaced by brick soldier course.

South elevation: 1 bay of primary brickwork at west end, with primary round-headed window with original cast-iron fenestration and 1950s brick sill. Inserted double doorway under concrete lintel beneath. To the east the walling is of 1950s brick, with large steel-framed windows with brick sills, under a continuous projecting concrete head in the Doncaster' s house style.

North elevation: As above, but abutted by Bldg. I1.1.

Interior: Little of note, excepting large cylindrical columns, possibly from former open sides. The roof is only just visible internally, and what can be seen is of bolted steel construction. This building appears to be roofless on the 1953 OS map. Elements of the original structure may survive, such as the cylindrical columns.

I1.1 1950s pent-roofed lean-to, matching 1950s walling to south elevation. No other features of note.

Interior has been stripped of machinery.

Assessment: Building I1 is the last surviving element of a long east-west range that abutted the north end of the 1861 Steel works. It appears to have been the Kitson's tyre mill. It appears to have lost all primary structural elements, except the gable and possibly the cast-iron columns.

I1.1 This 1950s pent-roofed lean-to is only of interest in the context of the site as a whole.

No detailed drawings are known to survive, except for various factory plans.

Buildings I2.1, I2.2, I2.3 and I2.4

Current / Last Use: I2.1: Compressor Blades – Inspection

I2.2: Compressor Blades – Screw Presses and Furnaces

I2.3 and I2.4: Compressor Blades – Polish Line

Known Historic Uses: I2.1 and I2.2: Site of Tyre Mill / Forge (1923, 1930s and 1944)

I2.1 and I2.2; Central Inspection Dept – Turbine Finished Blades Inspection, Returns Inspection Tit. Blades Final inspection, C/L Blades Dispatch; Blade Identification Dept (c.1956); North Inspection – Close Limit Use & Rough Turbine Use Blade Inspection; Blade Marking Dept (c.1957-64)

Build date: I2.1: Post-1951 on earlier building footprint

I2.2: 1950s on earlier building footprint

I2.3: Post-1963, pre-1975

I2.4: Post-1977

Description: I2.1: Modern double-height, steel-framed pent-roofed range, measuring c.33mx7m. Stanchions and principal rafters of large, continuous rolled steel joists, clad with modern profiled metal cladding.

I2.2: Large, triple-height, steel-framed range, measuring c.33mx8.5m, with modern profiled cladding and no ventilation clerestory. Massive stanchions bolted together from rolled steel sections, carrying modern rolled steel overhead-crane runners and deep, light-weight longitudinal Warren trusses carrying roof trusses and roof of profiled metal cladding. Longitudinal- and roof trusses also bolted together from rolled steel sections, both having gusset plates at junctions. Stanchions, longitudinal trusses and roof trusses are similar to those of 1911 ranges I4, I4.1 and I4.2, but post-date Doncaster's take over of the site in 1951.

I2.3 and I2.4: Two phases of modern double-height, steel-framed pent-roofed lean tos, both measuring c.33mx4m. Stanchions and principal rafters of large, continuous rolled steel joists, clad with modern profiled metal cladding.

Interior: All machinery removed.

Assessment: These ranges are only of interest in the context of the site as a whole.

It is currently uncertain whether detailed construction drawings survive on site.

Buildings I3, I3.1, I3.2 and I3.3

Current / Last Use: I3: Compressor Blades – Grinders

I3.1, I3.2 and I3.3: Compressor Blades – Screw Presses

Known Historic Uses: I3: W.B. Furnace, Oil Quench and Salt Bath; I3.1 and I3.2: (void), I3.3: Turbine Blades – Screw Presses, Furnaces and Grinders (c.1956); I3: 150 ton Crank Press, 200 ton Trimmer and Furnace; I3.1: (void), I3.2: 200 ton Massey Trimmer and Furnace, I3.3: Upsetter Dept – Furnaces and 60-180 ton Presses and Trimmers (c.1957-64)

Build date: I3: Stanchions and travelling crane runners post-1916, pre-1923 (probably 1916-18), Cladding and roof 1943 (Construction drawings)

I3.1: Roof and travelling crane runners post c.1957-64, pre-1968 (c.1957-64 Factory Plan and 1968 OS map)

I3.2: Roof post c.1956, pre- c.1957-64 (c.1956 and c.1957-64 Factory Plans)

I3.3: 1943 (Construction drawings)

Description: I3: Triple-height, steel-framed range, measuring c.15mx8m, with corrugated asbestos cladding, ventilation clerestory and slate roof covering. Supported on massive stanchions bolted together from rolled steel sections, carrying built-up overhead-crane runners and rolled steel joists carrying later roof trusses. Roof trusses bolted together from rolled steel sections, with gusset plates at junctions. Stanchions and crane runners date to c.1916-23, roof dates to 1943.

I3.1 Large, triple-height, steel-framed range, measuring c.15mx13m. Massive stanchions bolted together from rolled steel sections, carrying rolled steel overhead-crane runners and rolled steel joists carrying 1950/60s roof trusses. Roof trusses also bolted together from rolled steel sections, with gusset plates at junctions. South stanchions date to c.1916-18, whilst those to the north date to 1933-1944.

I3.2: Modern double-height, steel-framed pent-roofed range, measuring c.12.5x7m. Built-up stanchions to north date to 1933-1944, whilst the rolled steel principal rafters and other roof members date to the late 1950s.

I3.3: Triple-height, steel-framed range of 1943, measuring c.25mx8m. Massive stanchions bolted together from rolled steel sections, carrying rolled steel overhead-crane runners and rolled steel joists carrying roof trusses with gusset plates at junctions. Stanchions and roof trusses mimic earlier work (e.g. I2.2, I4, I4.1 and I4.2).

Interior: All plant and equipment has been removed.

Assessment: The modern ranges I3.1 and I3.2 are only of interest in the context of the site as a whole. Ranges I3 and I3.3 are of slightly more interest. I3.3 is an extension to the 1911 Tyre Mill (see below), constructed during the Second War. Range I3 has earlier origins, having been constructed as an un-roofed travelling crane associated with the 1911 Tyre Mill, during, or soon after, the First War. Its roof is later, but had been added in 1943. Again, despite their massive construction, such roofs are more commonplace survivals and normally of less technical interest than the surviving mid 19th-century metal-roofed buildings on the site. The variations in the constructional techniques of these various ranges might be considered to be of adequate historical and technical interest to merit some comparative recording however.

Detailed construction drawings of the 1943 ranges are known to survive on site. Plans of the later ranges are also likely to survive.

Buildings I4, I4.1, I4.2 and I4.3

Current / Last Use: I4: Large Blades – Devillois Spray Unit and Glass Dip

I4.1: Large Blades – Screw Presses and Furnaces

I4.2 and I4.3: Large Blades – sundry activities

Known Historic Uses: I4: New Tyre Rolling Plant (1911 Deposited plan); Tyre Mill (1923, 1930s, 1944); 60-200 ton Trimmers, Furnaces and 2000 ton Press (c.1956 and c.1957-64)

I4.1: New Tyre Rolling Plant (1911 Deposited plan); Tyre Mill (1923, 1930s, 1944); Heat Treatment Furnaces and Hot Inspection Cellar (c.1956 and c.1957-64)

I4.2: New Tyre Rolling Plant (1911 Deposited plan); Tyre Mill (1923, 1930s, 1944); Screw Press Dept – Furnaces, 120-200 ton Trimmers, 300–2000 ton Presses (c.1956 and c.1957-64)

I4.3: Furnaces and Trimming Presses (c.1956 and c.1957-64)

Build date: I4, I4.1 and I4.2: 1911, partially on earlier building footprint (1906 and 1916 OS maps)

I4.2: Post-1953, pre-c.1956 (OS 1953 map and c.1956 Factory Plan)

Description: I4, I4.1 and I4.2: Three large, triple-height, steel-framed ranges, measuring c.39mx9m, 50mx13m and 50mx8.5m, with slate roof cladding and continuous clerestory ventilation to ridges. Massive stanchions bolted together from rolled steel sections, carrying built-up overhead-crane runners and longitudinal Warren trusses carrying roof trusses. The longitudinal- and roof trusses are also bolted together from rolled steel sections, with gusset plates at junctions. The longitudinal trusses are shallower and heavier than those in range I2.2, whilst the stanchions and roof trusses appear earlier than those elsewhere. At the extreme eastern end of ranges I4 and I4.1 is a series of small adjoining structures, including an electrical switch-room, with offices over. Externally these are in the Doncaster' s house-style of the 1950s-60s, with a date of 1960 applied in cast, enamelled digits on the east elevation. These buildings retain fragmentary remains of a structure shown on the 1911 construction plans as 'Proposed New Building' .

I4.3: A long, single-height, pent-roofed lean-to range, measuring c.80mx4m. Stanchions and principal rafters of large, continuous rolled steel joists. Curtain walling of brick, with steel-framed windows with brick sills and continuous band of fenestration below the eaves, in Doncaster' s house style of the 1950s-60s. Roofed with profiled metal cladding.

Assessment: I4, I4.1 and I4.2: These three tall ranges date to 1911. They are of some historic and technical interest as a large-scale early 20th-century modernisation and expansion of the Tyre-making plant. They are the earliest of the high-roofed ranges that comprise Building Group I. Despite their massive construction, such roofs are more commonplace survivals and normally of less technical interest than the surviving mid 19th-century metal-roofed buildings on the site. These ranges might be regarded as being of high local historic significance because of the importance of the Monk Bridge Forge and the Leeds engineering industry.

I4.3 This 1950s pent-roofed lean-to is only of interest in the context of the site as a whole.

Detailed construction drawings of 1911 survive in Leeds City Archives.

Building I5

Current / Last Use: Large Blades – 14,000 ton press, Hydraulics Pit and Furnaces

Known Historic Uses: None

Build date: 1968-1975 (1968 OS map and 1975 Factory Plan)

Description: Massive triple-height, steel-framed range, measuring c.16mx26.5m, housing 14,000-ton hydraulic press. Stanchions and roof trusses welded together from rolled steel sections, carrying rolled steel overhead-crane runners. Clad externally with profiled metal cladding.

Interior: Now stripped of all machinery

Assessment: This building was of interest because of the vast 14,000-ton press it contained. The

building would appear to be contemporary with Bldg. D1, 'the Concorde Building'. The building is of little architectural note, but of some historic significance because of association with development of civil jet and supersonic passenger air travel. Representative of the expansion and modernisation of British engineering at the close of Harold Wilson's 'white heat of technology' period.

Construction drawings not yet located, but probably survive on site.

Buildings I6 and I6.1

Current / Last Use: I6: Compressor Blades – H.D.P.Finishing, Electro-Chem, Cold Trim, Kenston

I6.1: Store

Known Historic Uses: None

Build date: I6 and I6.1: 1963 – 1975 (probably late 1960s or early 1970s)

Description: I6 and I6.1: Large, modern, double-height, almost-flat-roofed workshop, measuring c.58mx19.5m and smaller garage / store measuring 6mx9m. Steel-framed, with curtain walling of aluminium-framed windows, profiled metal cladding and brick.

Interior: Now stripped of all machinery

Assessment: Large modern workshop and small modern garage / store of little architectural or historic note. Representative of the expansion and modernisation of the site at the close of Harold Wilson's 'white heat of technology' period.

Construction drawings not yet located, but probably survive on site.

2.2.10 Building Group J1 and J1.1

Current / Last Use: Compressor House and disused workshop

Known Historic Uses: J1: Air Compressor & Joiner's Shop (c.1956); Compressor House (c.1957-64).

J1.1: Joiners

Build date: J1: c.1870s-80s, rebuilt c.1957-64

J1.1: c.1957-64 (c.1956 and c.1957-64 Factory Plans)

Description: J1 and J1.1: Small single storey range, measuring c.5mx22m. Brick, with low parapet obscuring flat concrete roof. East wall of J1 and wall dividing J1 and J1.1 are 19th-century, with bricked up arches. All the remainder is from the 1950s / 1960s, in Doncaster's house-style. West elevation: 8 bays, with two roller doors and glazed double doors to Compressor House and roller door and doorway flanked by steel-framed windows with brick sills under concrete lintels to Joiners Shop. Single doorway in south elevation. Large riveted air receivers on roof, partly supported on re-used 19th-century riveted wrought-iron beam.

Assessment: Small 19th-century ancillary range, reconstructed and extended in Doncaster's house style in the 1950s or 1960s. J1 retains elements of the earlier building in its east and south walls. c.1956-64 and the air tanks mounted on the roof.

A building of only local interest at best, and that only because of its context.

Reconstruction drawings not yet located, but probably survive on site.

2.2.11 Building Group K (Bldgs. K1 to K1.15) - Viaduct Arches

Current / Last Use: K1: Maintenance Spares Store; K1.1: road; K1.2: void; K1.3: Welding Bay and Control; K1.4: Maintenance Workshop; K1.5: Ferric Sulphate tanks; K1.6: Maintenance Workshop; K1.7: void;

K1.8: Tool Fitting; K1.9: Die Storage; K1.10: Water Jet Cutting; K1.11: void (oil drums); K1.12: void (acid carboys); K1.13: Large Blades Stores; K1.14: incoming Gas House; K1.15: Tool Fitting

Known Historic Uses: 1923, 1930s and 1944: K1.8: Heavy workshop with travelling crane; K1.9: Travelling Crane; K1.15: workshop

c.1956 and c.1967-64: K1 to K1.2: void; K1.3: Fuel Dept; K1.4: void; K1.5: Acid Storage; K1.6: Jig Repair Dept; K1.7: Bricklayers; K1.8: unlabelled shed; K1.9: Fitters and Electricians; K1.10: General Stores; K1.11: Oil Store and Dry Chemicals Store; K1.12: Sodium Hydroxide storage shed; K1.13: void; K1.14: Gas Meter; K1.15: Welder's Shop

Build date: K1 to K1.2: void; K1.3: c.1950s-60s; K1.4: late 1950s-60s; K1.5: Modern tanks; K1.6: 1950s-60s; K1.7: 1950s-60s; K1.8: 1850s-1880s with 1950s-60 frontage; K1.9: late c.1914-23 with 1950s-60 frontage; K1.10: 1950s-60s; K1.11 and K1.12: void; K1.13: c.1970-75; K1.14: 1960s; K1.15: c.1914-23

Description: A series of sundry and ephemeral workshops and stores inserted beneath railway viaduct arches. Generally flat-roofed brick structures or wider span sheds with fabricated steel frames and steel-trussed roofs, dating to the 1950s-1960s. The only elements of significant interest are the earlier elements, namely K1.8, K1.9 and K1.15.

K1.8 is the most historic structure, comprising a timber-built shed with a robust timber frame, timber cladding (to the sides and rear) and a stout king-post trussed roof. An inserted frontage belies its early origins, which appear to lie in the period c.1850s-80s. It contains an early travelling crane. Both the shed (then open-fronted) and the travelling crane are shown on the 1923 Factory Plan.

K1.9 adjacent contains a steel-framed shed with steel-trussed roof and a travelling crane. Both the shed (then open-fronted) and the travelling crane are shown on the 1923 Factory Plan.

K1.15 is the third historic element, again consisting of a steel-framed shed with steel-trussed roof. The shed (then open-fronted) is also shown on the 1923 Factory Plan.

Interiors: Most machinery and plant has been removed.

Assessment: Generally these sheds date to the 1950s and 1960s and are of little note, excepting in the context of the site as a whole. The earlier sheds, notably K1.8, and the two early travelling cranes are of some note as surviving elements from the iron and steelworks.

Some construction and reconstruction drawings noted on site, others are likely to survive.

3 Planning Background

The previous site owners (Doncaster's Ltd) obtained draft planning consent (Planning Application No. 20/527/04/OT) for a residential development on this site. An archaeological and architectural recording condition was attached to that draft consent. The site has since been acquired by HBG Properties, who have resolved not to proceed with the approved scheme, but who nevertheless wish to proceed with the recording of the standing buildings as a goodwill gesture. Because the recording is not conditional on a live consent, this specification has been prepared by HBG Properties' agents RPS (Mallams Court, 18 Milton Park, Abingdon, Oxon, OX14 4RP, contact Rob Kinchin-Smith ☎ 01235 838236), in conjunction with WY Archaeology Advisory Service (as LCC's archaeological advisor).

4 Archaeological Interest

4.1 Historical Background

The buildings on the Doncaster's site originated as the Monk Bridge Forge, established in 1851 and 1854 by Stephen Witham. Witham's forge, which occupied the eastern half of the present site, was sold in 1854

to James Kitson (later Lord Airedale), owner of the Airedale (locomotive) Foundry, which was then one of the principal locomotive manufactories in the world. Kitson wanted the forge as he needed its capability for producing wrought iron of various grades and large and high-quality forged components such as crank axles, straight axles, tyres and draw-gear for railway purposes. By 1858 Kitson and his sons had enlarged the works to encompass the extent of the present site, the new land apparently soon serving as the location for a specialised steel plant producing crucible (and possibly puddled) steel and weldless tyres for railway wheels. The works, now known as the Monk Bridge Iron & Steel Works, developed a reputation for producing iron and steel of the highest quality and the growth in demand for its products prompted the Kitsons to purchase further land to the south of the Whitehall Road in August 1864, which grew into a significant steelworks (now demolished) following the adoption of the Siemens-Martin open-hearth process sometime between c.1882 and 1886.

As the reputation of the iron and steel forgings produced by the Monk Bridge Iron & Steel Company grew, further investments were made in new buildings and plant, allowing massive forgings to be produced and by the time of the First War the works was of such strategic importance that it was taken under direct Government control. The importance of the site was maintained against a worsening financial situation during the 1920s and 30s, with iron production being scaled down. A revival followed during the Second War but the decline in the Leeds engineering industry meant that the firm collapsed in 1949.

The works were purchased by the Sheffield forging firm of Doncaster' s in 1951 and the site was extensively modernised in the 1950s and 1960s to produce turbine blades, including for the developing jet-aviation industry, an industry in which the UK was a world leader. The works became of international importance during this period and it received further investment in the late 1960s and early 1970s, partly in association with the Concorde programme.

More recently Doncaster' s decided to transfer production to its sites in Sheffield and Blaenavon, South Wales. This process has now been completed and as a result the site has been stripped of all plant and machinery.

In terms of the site' s interest, it retains buildings dating from 1850s to the 1980s. These are of some local and regional historic and technical interest due to the importance of Leeds' 19th-century engineering prowess. No buildings have been identified that are of national significance. The buildings of interest break down into the following groups:

Early offices, cottages and ancillary workshop buildings (1851-c.1870): Bldgs A1 (fragments), A3, B1, B2 and K1.8

19th-century steelworks, tyre mill and forges (mostly c.1861-c.1879): B5 (roof), E1, G1(fragments), G1.1 and I1 (west elevation)

Later 19th century offices and ancillary workshops (1875-1891): A4, B3 and B4

Early 20th century offices and ancillary workshops (c.1900-1920): F1, K.9 and K.15

Early 20th century tyre mill (1911 and c1916-23): I3 (parts), I4, I4.1 and I4.2

Second War extensions to tyre mill (1943): I3 (roof), I3.3

Early Doncaster' s buildings (1951 to c.1965): Notably C1, C1.1, F1.2, H1, H1.1, H1.2 and I2.2

Later Doncaster' s buildings (c.1965-c.1975): Notably D, G1.3, I5 and I6

Of these groups, the earlier of the 19th-century offices and cottages (A1, B1 and B2) are all much altered and of only very limited architectural interest. They are nevertheless of some limited historic interest because of their association with this historic engineering complex. Building A4 has more architectural pretensions, with its terracotta Jacobean detailing externally and some surviving internal architectural features. This building is

internally much altered however, and thus only of local or low regional significance, notwithstanding the national importance of the company it was built for. Historic construction (or reconstruction) drawings have survived for many of these buildings and it is considered that they would merit photographic and written record only.

The 19th-century ancillary workshops (A3, B3, B4 and K1.8) are of slightly greater technical interest, because they were indirectly associated with the production processes carried out on the site. None retain any historic equipment, or any evidence of such equipment however and all have been significantly altered. Furthermore, virtually all of the modern plant and machinery has also been removed. No original construction drawings have survived, but detailed plans for Buildings B3 and B4 dating to the 1920s-1940s have survived. Because these buildings were only peripherally associated with the main production processes, and because they have been significantly altered in the 20th Century, it is considered that they would also merit photographic and written recording only.

Whilst much fragmented and altered, the surviving 19th-century steelworks and forge buildings (B5 (roof), E1, G1 (ironwork fragments in south elevation), G1.1 and I1 (west elevation)) are of greater technical and historic interest. This is partly as examples of an increasingly rare building type that typified an industry of very high regional importance. They are also of interest because of their characteristic form and the details of their modular structure of cast-iron columns, wrought-iron lattice and plate girders and their wrought-iron-trussed roofs. As such, these buildings form part of a canon of buildings nationally that have iron frames and roof trusses and which are of technical interest in the development of iron and steel framed buildings. Detailed construction drawings of some of these buildings (notably B5 and G1), as well as some similar buildings that have been demolished, fortunately survive in Leeds City Archives. Whilst of insufficient technical interest and too altered to be merit Listing, it is considered that these structures are of adequate historical and technical interest to merit comparative study, to include photographic recording of details, written description and the survey and preparation of comparative cross-sections.

The remaining workshops, including the early 20th-century, high-roofed tyre mill / forge buildings, dating to c.1911 (I4, I4.1 and I4.2) are significantly better represented in the extant historic drawn record. It is considered that these buildings will only merit photographic and written recording.

4.2 Impact of proposed development

The impact of the proposed development is currently unclear. It nevertheless may require the demolition of all buildings on the Site, excepting the Listed railway viaduct. The gable on the north-eastern side of Building B5 (with 1861 date-stone and hanging ram plaque, may be retained in situ. Artefacts are to be retained for the eventual creation of a public artwork, to include an interpretation of the past industrial use of the site.

5 Aims of the Project

5.1 The aim of the proposed work is to identify and objectively record by means of photographs and annotated and measured drawings any significant evidence for the original and subsequent historical form of the buildings within the former Monk Bridge Forge / Doncaster' s complex. Use will be made wherever possible of existing records, notably Deposited Building Plans in Leeds City Archives and the extensive archive currently held on site.

5.2 The second aim of the proposed work is to present this information as an archive and as an illustrated report. The roles of historical plan form, technical layout and process flow should all be considered in this process of interpretation and recording.

6 Recording Methodology

6.1 General Instructions

6.1.1 Health and Safety The archaeologist on site will naturally operate with due regard for Health and Safety regulations, specifically the *Management of Health and Safety at Work Regulations 1999*. The site was only recently in active industrial use, is secure and has an active 24-hour security presence. The removal of plant and machinery has left a number of trip- and fall hazards. Prior to the commencement of any work on site (and preferably prior to submission of the tender) the archaeological contractor is required to carry out a Risk Assessment on these structures in accordance with the Health and Safety at Work Regulations. On the basis of this Risk Assessment, the contractor should then submit in writing to RPS a strategy for safe working. The contractor should consider the possibility of applying remote measuring techniques where appropriate. The contractor is expected to make a reasonable effort to execute the recording work. If a portion of the complex is legitimately judged to be inaccessible without breach of the Health and Safety at Work Regulations, even with the provision of additional reinforcement, then confirmation of this judgement by a competent and appropriately qualified individual or organisation must be submitted in writing to the West Yorkshire Archaeology Advisory Service and RPS. Neither the WY Archaeology Advisory Service nor RPS can be held responsible for any accidents which may occur to outside contractors engaged to undertake this survey while attempting to conform to this specification.

6.1.2 Confirmation of adherence to specification

Prior to the commencement of any work, the archaeological contractor must confirm in writing adherence to this specification, or state in writing (with reasons) any specific proposals to vary the specification. Should the contractor wish to vary the specification, then written confirmation of the agreement of RPS and the WY Archaeology Advisory Service to any variations is required prior to work commencing. Unauthorised variations are made at the sole risk of the contractor (see para. 8.3, below). Modifications presented in the form of a re-written project brief will not be considered by RPS or the West Yorkshire Archaeology Advisory Service.

6.1.3 Confirmation of timetable and contractor's qualifications

Prior to the commencement of work on site, the archaeological contractor should provide RPS and the WY Archaeology Advisory Service in writing with a projected timetable for the site work, and with details regarding staff structure and numbers. *Curriculum vitae* of key project members (including photographer, any proposed specialists etc.), along with details of any specialist sub-contractors, should also be supplied to RPS and the WY Archaeology Advisory Service if the contractor has not previously done so. All project staff provided by the archaeological contractor must be suitably qualified and experienced for their on-site roles, in accordance with PPG 16 para. 21. In particular, staff involved in building recording should have proven expertise in the recording and analysis of industrial buildings.

6.1.4 Site preparation

Widespread removal of modern material that may obscure material requiring an archaeological record will not be practical on a site of this scale and nature. Where practical and appropriate, it is expected that the contractor will carry out limited operations such as the removal of occasional suspended ceiling panels so as to reveal decorative or structural detail however.

6.1.5 Documentary research

In addition to the large drawn archive that exists on site, desk-based assessments of the site have been carried out by Structural Perspectives and by RPS in November of 2004. These reports are held by both RPS and the County Sites and Monuments Record (Registry of Deeds, Newstead Road, Wakefield WF1 2QP ☎ 01924 306797). RPS also hold digital copies of a number of historic plans of the site. Prior to the commencement of work on site, the contractor should gain access to and carefully examine all aspects of these archives and assessments, in order to inform the archaeological recording by providing background information with regard to function and phasing. Please note that the SMR makes a charge for commercial

consultations.

6.1.6 Use of existing plans

Deposited plans of many of the site's buildings are held by Leeds City Archives. Furthermore, there is a very large archive of historic building, factory and machinery plans extant on site. The plans which are currently held on site, which are to be offered to an appropriate public local repository for permanent keeping, are to form a key component of the recording exercise and will form the principal component of the drawn record. They will be used as the basis for the drawn record and for any annotation relative both to the historic and photographic record.

6.2 Recording Methodology

The principal of the recording proposed is that a general written and photographic record of the site be undertaken, which will supplement limited additional purposive measured survey and the extensive drawn archive that exists on site and in the Deposited Building plans section of Leeds City Archives. The final report to be produced will incorporate both the results of the purposive photographic and written recording, together with extensive use of extracts from the historic plans available.

6.3 Written Record

The archaeologist on site should carefully examine all parts of each building prior to the commencement of the drawn and photographic recording, in order to identify all features relevant to its original and later use. As part of this exercise, the archaeologist on site should produce written observations (e.g. on phasing; on detailing, on building function) sufficient to permit the preparation of a report on the structures. This process should include the completion of a Room Data Sheet or similar structured recording pro-forma for each room or discrete internal space within the volume of the structure. The crucial requirement is that each space should be examined individually and the results of that examination noted in a systematic fashion. The WY Archaeology Advisory Service recommend the employment of the attached pro-forma, but WY Archaeology Advisory Service and RPS will consider any suitable alternative which the archaeological contractor may wish to submit (Note that agreement for the employment of an alternative *schema* must be obtained in writing from RPS and the WY Archaeology Advisory Service prior to the commencement of work on site). The completed report will require a section comparing and discussing the larger iron- and steel-framed 19th and early 20th-century buildings. The written record should thus specifically include a measured record of bay-widths, bay-lengths, column diameters etc, with measurements expressed in both metric and imperial units.

6.4 Drawn Record

6.4.1 Drawings required

It is also anticipated that most of the drawings that will illustrate the final report will be selected from the historic elevations, floor plans and cross-sections available on site and in Leeds City Archives. Generally it is expected that most on-site drawn recording will be made by annotating the most recent (6/09/02) factory plan. This only shows buildings at approximate street level and this plan will need to be supplemented by the most recent available plans showing upper storey and / or basements. These annotated floor plans will form part of the site archive only and will not need to be re-drawn to publication standard. Because of the quantity and quality of historic drawn material available, it is anticipated that the only purposive drawn recording required to be completed to publication standard will be comparative plans and cross-sections through the remaining 19th-century iron-roofed ranges, all of which appear to share a generally standardised set of structural details, probably evolved in 1854 with the erection of Witham's forge and then replicated in-house by the Kitsons until 1881 or later. In the report these cross-sections will be compared to similar ranges on site (extant and lost) for which historic drawings survive (principally Building B5 (north end), Building G1, the lost 1881 range located to the west of G1, the lost 1881 roof over 28 and 29

furnaces and the 1911 Tyre Mill (Building B5 (north end)) and to lost ranges for which other information such as photographs or plan information is available. These purposive plans and cross-sections will comprise:

Building B5 (plan and cross-section at its widest point)

Building E1 (plan, south and east elevations (reconstructed) and composite cross-section of best-preserved parts)

Building G and G1.1 (plan and cross section through G1.1)

Site recording should be made at a 1: 100 level of detail, for publication at 1:200 or 1:250. The exact placement of all sections is to be agreed with RPS prior to the commencement of work on site. The structures should be recorded as existing, although but a clear distinction should be made on the final drawings between surviving as-built features, material introduced in the structure during the 20th-century. Extrapolated or interpolated lost features such as engine houses, læstsupporting columns, vented hot-work clerestories, slates, rafters etc. should be clearly identified as such in the drawn record.

6.4.2 Scope of record

In the written record, and in the annotation of existing floor plans, all features of archaeological and architectural interest identified during the process of appraisal should be noted. In addition to evidence relating to the function of each building, the record should identify and note:

any significant changes in construction material – this is intended to include significant changes in brick type

any blocked, altered or introduced openings

evidence of the historic status or use of a space or building (e.g. in-situ plant or machinery, plasterwork, moulded joinery etc)

evidence for phasing, and for historical additions or alterations to the building. This should include comparison of brick types, comparison of architectural detail eaves details, lintels, sills and the use of the same moulded joinery details in different buildings, indicative of concurrent phasing.

This list should not be treated as exhaustive.

6.4.3 Dimensional accuracy

Dimensional accuracy should accord with the normal requirements of the English Heritage Architecture and Survey Branch (at 1:20, measurements should be accurate to at least 10mm; at 1:50, to at least 20mm; at 1:100, to at least 50mm).

6.4.4 Drawing method

For reasons of safety and access, the measured elevations and cross-sections will need to be made by means of reflectorless EDM or other remote measuring technique such as hand measurement with Distomat or commercial laser-tape. If finished drawings are generated by means of CAD or a similar proven graphics package, recorders should ensure that the software employed is sufficiently advanced to provide different line-weight (point-size); this feature should then be used to articulate the depth of the drawings. What is required as an end product of the survey is a well-modelled and clear drawing; ambiguous flat-line drawings should be avoided. Drawing conventions should conform to English Heritage guidelines as laid out in RCHME 1996, *Recording Historic Buildings - A Descriptive Specification (3rd Edition)*.

6.5 Photographic Record

6.5.1 External photographs

An external photographic record should be made of all elevations of each building, from vantage points as nearly parallel to the elevation being photographed as is possible within the constraints of the site. The contractor should ensure that all visible elements of each elevation are recorded photographically; this may require photographs from a number of vantage points. A general external photographic record should also be made which includes a number of oblique general views of the buildings from all sides, showing them and the complex as a whole in its setting. In addition, a 35mm general colour-slide survey of the buildings should also be provided (using a variety of wide-angle, medium and long-distance lenses). While it is not necessary to duplicate every black-and-white shot, the colour record should be sufficiently comprehensive to provide a good picture of the form and general appearance of the complex and of the individual structures.

6.5.2 Internal photographs

A general internal photographic record should be made of each building. In larger production and workshop buildings, and spaces with features of architectural or historical note, general views should be taken of *each room* or discrete internal space from a sufficient number of vantage points to adequately record the form, general appearance and manner of construction of each area photographed. Whilst many of the post-1950 production buildings merit a similar level of record to the earlier structures, ~~many of the~~ those offices and smaller spaces which are wholly, or mostly, modern in appearance, character and materials, will merit only a single internal shot, in order to record current appearance.

6.5.3 Detail photographs

The general record photographs are to be supplemented by detailed record shots should be made of all individual elements noted in section 6.4.2 above. Elements for which multiple examples exist (e.g. each type of roof truss, column or window frame) may be recorded by means of a single representative illustration. **N.B.** Detail photographs must be taken at medium-to-close range and be framed in such a way as to ensure that the element being photographed clearly constitutes the principal feature of the photograph. Detail photographs will specifically (but not exclusively) be required in order to record the structural details and components of current and former 19th-century iron-framed buildings.

6.5.4 Equipment

General photographs should be taken with a Large Format camera (5" x 4" or 10" x 8") using a monorail tripod, or with a Medium Format camera which has perspective control, using a tripod. The contractor must have proven expertise in this type of work. Any detail photographs of structural elements should if possible be taken with a camera with perspective control. Other detail photographs may be taken with either a Medium Format or a 35mm camera. Unless there are good reasons otherwise (e.g health and safety or there being sufficient natural scale from items such as furniture – subject to the judgement of RPS), all detail photographs must contain a graduated photographic scale of appropriate dimensions (measuring tapes and surveying staffs are not considered to be acceptable scales in this context). A 2-metre ranging-rod, discretely positioned, should be included in a selection of general shots, sufficient to independently establish the scale of all elements of the building and its structure.

6.5.5 Film stock

All record photographs to be black and white, using conventional silver-based film only, such as Ilford FP4 or HP5, or Delta 400 Pro (a recent replacement for HP5 in certain film sizes such as 220). Dye-based (chromogenic) films such as Ilford XP2 and Kodak T40CN are unacceptable due to poor archiving qualities. Digital photography is unacceptable due to unproven archiving qualities.

6.5.6 Printing

Record photographs should be printed at a minimum of 5" x 4". In addition, a small selection of

photographs (the best of the exterior setting shots and interior shots) should be printed at 10" x 8" . Bracketed shots of identical viewpoints need not be reproduced, but all viewpoints must be represented within the report. Prints may be executed digitally from scanned versions of the film negatives, and may be manipulated to improve print quality (but **not** in a manner which alters detail or perspective). All digital prints must be made on paper and with inks which are certified against fading or other deterioration for a period of 75 years or more when used in combination. If digital printing is employed, the contractor must supply details of the paper/inks used in writing to the WY Archaeology Advisory Service, with supporting documentation indicating their archival stability/durability. Written confirmation that the materials are acceptable must have been received from the WYAAS prior to the commencement of work on site.

6.5.7 Documentation

A photographic register detailing (as a minimum) location, direction and subject of shot must accompany the photographic record; a separate photographic register should be supplied for any colour slides. Position and direction of each photograph should be noted on a copy of the building plan, which should also be marked with a north pointer; separate plans should be annotated for each floor of each building

7. Post-Recording Work and Report Preparation

7.1 After completion of fieldwork

As soon as possible following the completion of fieldwork, RPS will arrange a meeting at the offices of the WY Archaeology Advisory Service to present a draft of the 1st- stage drawn record (fully labelled and at the scale specified above), a photo-location plan, and photographic contact prints adequately referenced to this plan, in order that the Service may confirm that the fieldwork has been completed to a satisfactory standard (material supplied will be returned to the contractor). **N.B.** digital versions of film prints will not be acceptable for this purpose. The WY Archaeology Advisory Service will then confirm to RPS that fieldwork has been satisfactorily completed.

7.2 Report Preparation

7.2.1 Report format and content

A written report should be produced. This should include:

an executive summary including dates of fieldwork, name of commissioning body, and a brief summary of the results including details of any significant finds

an introduction outlining the reasons for the survey

a historical background section placing the complex in its local and historical contexts, describing and analysing the development of the complex as a whole. This analysis should consider the site type as an integrated system intended to perform a specialised function, with particular attention being given to historical plan form, technical layout and process flow. This section should draw heavily on the desktop studies already undertaken by RPS and Structural Perspectives.

a brief architectural and historical description of each building correlated to the drawn and photographic record, presented in a logical manner. This will consist 1) a summary of the known historic and modern maps, plans and other sources for each; 2) a summary history of each building, as deduced from these sources, placing each its local and historical contexts and 3) a description of each building, as a walk around and through each building, starting with setting, then progressing to all sides of the structure in sequence, and finally to the interior from the ground floor up.

Both architectural description and historical/analytical discussion should be fully cross-referenced to the drawn and photographic record, sufficient to illustrate the major features of the site and the major points raised.

It is not envisaged that the report is likely to be published, but it should be produced with sufficient care and attention to detail to be of academic use to future researchers. A copy of this specification and a quantified index to the field archive should also be bound into the back of the report. The cover sheet should include a centred eight-figure OS grid reference and the name of the township in which the site is located (Holbeck).

7.2.2 Report Illustrations

Illustrations should include:

a location map at a scale sufficient to allow clear identification of the site in relation to other buildings on in the immediate area

an overall keyed plan of the site, with building numbers to be consistent with the RPS desk-based study, showing the surviving buildings in relation to each other and to the buildings on site which have been demolished (a detailed site plan is available from RPS)

any relevant historic map editions, with the position and extent of the site clearly indicated (RPS also hold copies of all relevant map editions)

a complete set of floor plans of each building as existing (normally derived from existing plans with additional annotation to publication standard where appropriate, sufficient to illustrate points made in written text) at appropriate and consistent scales (normally 1:100 or 1:200 / 1:250 for larger buildings)

selected excerpts from historic building plans, photographs etc suitable to demonstrate (where possible) the original plan, appearance and form of each building, and subsequent major changes

The purposive plans and cross-sections described above at appropriate and consistent scales (normally 1:100 or 1:200 / 1:250 for larger buildings):

Building B5 (reconstructed plan and cross-section)

Building E1 (plan, reconstructed plan, south elevation, reconstructed east and reconstructed cross-section)

Building G and G1.1 (reconstructed plan and cross section through G1.1)

a complete set of plans, on which position and direction of each photograph has been noted

a complete set of good-quality laser copies of all photographs.

The latter should be bound into the report, building-by-building, in the same logical sequence employed in the architectural description (Para. 7.2.1 above) and should be appropriately labelled (numbered, and captioned in full). When captioning, contractors should identify the individual photographs by means of a running sequence of numbers (e.g. Plate no. 1; Plate no. 2), and it is this numbering system which should be used in cross-referencing throughout the report and on the photographic plans. However, the relevant original film and frame number should be included in brackets at the end of each caption.

7.3 Report deposition

7.3.1 General considerations

Two copies of the approved final draft of the report should be supplied to RPS (to include one for the client) and identical copies supplied to the County SMR and to the WY Archive Service. The copy supplied to the County SMR should include a complete set of photographic prints (see Para. 7.3.2 below). The finished report should be supplied within sixteen weeks of completion of all fieldwork. The information content of the report will become publicly accessible once deposited with the Advisory Service, unless confidentiality is requested, in which case it will become publicly accessible six months after deposit.

7.3.2 Deposition with WY Archaeology Advisory Service (County Sites and Monuments Record)

The report copy supplied to the WY Archaeology Advisory Service should also be accompanied by both the photographic negatives and a complete set of labelled photographic prints (mounted in KENRO display pockets or similar, and arranged in such a way that labelling is readily visible) bound in a form which will fit readily into a standard filing cabinet suspension file (not using hard-backed ring-binders). Labelling should be in indelible ink on the *back* of the print or on applied printed labels and should include:

film and frame number

date recorded and photographer's name

name and address of building

national grid reference

specific subject of photograph.

Colour slides should be mounted, and the mounts suitably marked with – 'Holbeck' , with 'Doncaster' s' under, at the top of the slide; grid reference at the bottom; date of photograph at the right hand side of the mount; subject of photograph at the left hand side of the mount. The slides should be supplied to the WY Archaeology Advisory Service in an appropriate, archivally stable slide hanger (for storage in a filing cabinet).

7.4 Summary for publication

The attached summary sheet should be completed and submitted to the WY Archaeology Advisory Service for inclusion in the summary of archaeological work in West Yorkshire published on the WYAAS website.

7.5 Preparation and deposition of the archive

After the completion of all recording and post-recording work, a fully indexed field archive should be compiled consisting of all primary written documents and drawings, and a set of suitably labelled photographic contact sheets (only). The field archive should be deposited with the Leeds Office of the West Yorkshire Archive Service (Chapelton Road, Sheepscar, Leeds LS7 3AP tel. 0113-214 5814 leeds@wyjs.org.uk), and should be accompanied by a copy of the full report as detailed above.

8 General considerations

8.1 Technical queries

Any technical queries arising from this specification should be addressed to the WY Archaeology Advisory Service without delay.

8.2 Authorised alterations to specification by contractor

Archaeological contractors submitting tenders should carry out an inspection of the site prior to submission. If, on first visiting the site or at any time during the course of the recording exercise, it appears in the archaeologist's professional judgement that

- i) a part or the whole of the site is not amenable to recording as detailed above, and/or
- ii) an alternative approach may be more appropriate or likely to produce more informative results, and/or
- iii) any features which should be recorded, as having a bearing on the interpretation of the structure, have been omitted from the specification,

then it is expected that the archaeologist will contact RPS as a matter of urgency. If contractors have not yet been appointed, any variations which RPS considers to be justifiable on archaeological grounds will be incorporated into a revised specification, which will then be re-issued to the developer for redistribution to the tendering contractors. If an appointment has already been made and site work is ongoing, RPS will

resolve the matter in liaison with the developer, the WY Archaeology Advisory Service and the Local Planning Authority.

8.3 Unauthorised alterations to specification by contractor

It is the archaeological contractor' s responsibility to ensure that they have obtained RPS' s consent in writing to any variation of the specification prior to the commencement of on-site work or (where applicable) prior to the finalisation of the tender. Unauthorised variations may result in the WY Archaeology Advisory Service being unable to recommend discharge of the archaeological recording condition to the Local Planning Authority and are made solely at the risk of the contractor.

8.4 Monitoring

This exercise will be monitored as necessary and practicable by RPS, with advice from the WY Archaeology Advisory Service in its role as 'curator' of the county's archaeology. RPS should receive at least one week' s notice in writing of the intention to start fieldwork. A copy of the contractor' s Risk Assessment should accompany this notification.

8.5 Valid period of specification

This specification is valid for a period of one year from date of issue. After that time it may need to be revised to take into account new discoveries, changes in policy or the introduction of new working practices or techniques.

Any queries relating to this specification should be addressed to RPS without delay.

Relevant contacts:

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RPS

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