

Monk Bridge Forge, Whitehall Road, Holbeck, Leeds, West Yorkshire

National Grid Reference: SE 2903 3307

Archaeological Building Recording

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Volume One

Index

Volume 1	Report and appendices
Volume 2	Photographic registers & location plans
Volume 3	Report plates 1-182
Volume 4	Report plates 183-372

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OASIS SUMMARY FORM

PROJECT DETAILS	
OASIS identifier	
Project title	[short name of site, not type of archaeological work]
Short description of the project	[maximum 250 words, copy non-technical summary and shorten if necessary]
Project dates	[start and finish date of project, preferably in 10-05-08 format]
Previous/future work	[e.g. "desk-based assessment/none" , "none/evaluation"]
Monument type and period	[e.g. "Cutlery works – post-medieval; back-to-back houses – post-medieval"]
Significant finds (artefact type and period)	[e.g. "food serving container – post medieval; metal working debris – post-medieval" , or "none"]
PROJECT LOCATION	
County/Parish	
Site address	[full address including post-code if possible]
Site co-ordinates	[NGR]
Site area	[in m ² or hectares]
Height OD	[maximum and minimum height OD]
PROJECT CREATORS	
Organisation	ARCUS
Project brief originator	[e.g. SYAS, WYAAS]
Project design originator	
Project supervisor	
Project manager	
Sponsor or funding body	[client name]

PROJECT ARCHIVES		
Archive Type	Location/Accession no.	Content (e.g. pottery, metalwork, etc)
Physical	[Museum/Archive]	[material types to be deposited in archive]
Paper	[Museum/Archive/SMR]	[report, context sheets, plans, sections, etc]
Digital	[SMR]	[pdf copy of report?]
BIBLIOGRAPHY		
Title	[of this report]	
Report no		
Author		
Date	[month and year of issue]	

CONTENTS

OASIS SUMMARY FORM	II
ILLUSTRATIONS AND PLATES	VI
VOLUME 1.....	vi
VOLUME 2 (photographic location plans and registers).....	viii
VOLUME 3 (photographic plates).....	ix
VOLUME 4 (photographic plates).....	xiv
NON-TECHNICAL SUMMARY	XXI
1 INTRODUCTION	1
2 AIMS AND METHODOLOGY	1
2.1 Project Aims and Rationale.....	1
2.2 Methodology.....	1
2.3 Fieldwork Programme	2
2.4 Site Location and Current Land Use.....	2
2.5 Previous Survey.....	3
3 HISTORICAL BACKGROUND	4
3.1 Historical Context of Monk Bridge Forge.....	4
3.2 The Monk Bridge Steel and Iron Works.....	6
3.3 Summary of Key Historical Dates and Events.....	9
3.4 Historical Archives.....	9
3.5 1855 Painting of Monk Bridge Forge.....	10
4 BUILDING DESCRIPTIONS	13
4.1 Introduction	13
4.2 Site Orientation	14
4.3 Building Descriptions.....	14
5 PHASED DEVELOPMENT OF BUILDINGS.....	43
5.1 Phase One (1851 to 1875).....	43
5.2 Phase Two (1876 to 1900).....	44
5.3 Phase Three (1901 to 1925)	45
5.4 Phase Four (1926 to 1950)	45
5.5 Phase Five (1950 to 1975)	45
5.6 Phase Six (1975 to 2006).....	46
6 CONCLUSION.....	46
7 COPYRIGHT	47
8 ACKNOWLEDGEMENTS	47
9 BIBLIOGRAPHY AND SOURCES.....	48

10 ILLUSTRATIONS.....	50
APPENDIX 1: WYAAS PROJECT SPECIFICATION.....	51

ILLUSTRATIONS AND PLATES

VOLUME 1

- 1 Site location map
- 2 Site plan
- 3 Masser 6" : 1 mile 1858 map
- 4 1866 map
- 5 1882 map
- 6 1888 – 90 map
- 7 1890 map
- 8 1893 map
- 9 1906 Scanned plan including cottages
- 10 1908 map
- 11 1921 map
- 12 1932 map
- 13 1940s factory plan
- 14 1944 site plan
- 15 Site plan 1952, showing Building G joining with range A
- 16 1953 map
- 17 1957 – 64 map
- 18 1963 map
- 19 Site plan with phasing
- 20 Building A floor plans
- 21 Building B1 – B4, floor plan of front range, 1941
- 22 Building B, section of front range, 1941
- 23 Building B3 and B4, "Machine shop on iron side" , undated
- 24 Building B, cellar and ground floor plans
- 25 Building B, first and second floor plans
- 26 Site plan 1967, showing elevation B5
- 27 Building B5, 1967

- 28 Building B5, 1967
- 29 Building B5, 1967
- 30 Building B5, ground floor plan
- 31 Building B5, section D – D1
- 32 Building C, ground floor plan
- 33 Building D, 1972
- 34 Building D, elevation
- 35 Building D, 1972
- 36 Building B & D, plan
- 37 Building D, floor plans
- 38 Truss diagram showing removal of louvre and altered roof pitch, 1961
- 39 Building E1, ground floor plan
- 40 Building E, section B – B1 with detail of a truss union
- 41 Building E, elevation A – A1
- 42 Building E, section C – C1 (overview)
- 43 Building E, elevation C – C1, part (I)
- 44 Building E, elevation C – C1, part (II)
- 45 Building E, elevation C – C1, part (III)
- 46 Building E, elevation C – C1, part (IV)
- 47 3D impressions of column in Building E, Section B – B1
- 48 Building F, extension, 1956
- 49 Building F, ground floor plan
- 50 Building F, floor plans
- 51 Alterations to Building G, 1952
- 52 Building G, Ground Floor Plan
- 53 Building G, section E – E1
- 54 Building H extension, undated
- 55 Building H extension, undated
- 56 Building H, elevation

- 57 Building H, ground floor plan
- 58 Building I, 1911 plan and section of rolling plant
- 59 Building I, stanchion and aisle extension, undated
- 60 Building I, section
- 61 Building I, 1972 - 3
- 62 Building I, plan
- 63 Building I, Ground Floor Plan
- 64 Tanks on roof of Building J, undated
- 65 Tanks on roof of Building J, undated
- 66 Building J, floor plans
- 67 Building K, ground floor plan

VOLUME 2 (photographic location plans and registers)

- 68 Site plan with exterior photo locations
- 69 Building A with photo locations
- 70 Building B with photo locations (cellar and ground floor)
- 71 Building B with photo locations (first and second floor)
- 72 Building C with photo locations
- 73 Building D with photo locations
- 74 Building E with photo locations
- 75 Building F with photo locations
- 76 Building G with photo locations
- 77 Building H with photo locations
- 78 Building I with photo locations
- 79 Building J with photo locations
- 80 Building K with photo locations

VOLUME 3 (photographic plates)

- 1** General shot of south elevation of south range (east) Buildings A1 (right) to A4 (left) (film 6.5)
- 2** General shot of north elevation of south range (east) Buildings A2 (left) to A4 (centre right) (film 10.9)
- 3** General shot of south elevation of south range (west) Buildings B1 (right) to B4 (left) (film 6.8)
- 4** General shot of south elevation of south range (west) Buildings B1 (right) to B4 (left) (film 1.1)
- 5** General shot of north elevation of south range, (west) Buildings B1 (left) to B4 (right) (film 7.1)
- 6** General shot of works from bridge (film 2.8)
- 7** East elevation of Building A1 (right) with A2 beyond (Building H to right) (film 4.3)
- 8** South elevation of A1 (right) and A2 (left) (film 4.9)
- 9** North elevation of A1, and tunnel beneath A1 B1 (film 10.7)
- 10** Shot from A2.1 G2 into A2.1 G1 (film 43.13)
- 11** A1 G2, bricked up doorway to street (film 43.11)
- 12** South elevation of A2 (film 5.2)
- 13** North elevation of A2.1 (Building A3 to right) (film 10.5)
- 14** North elevation of A2 and A2.1 (film 10.3)
- 15** A2 G1, general shot (film 43.9)
- 16** A2.1 F1, general shot (film 43.3)
- 17** A2.1 G2, general shot (film 43.7)
- 18** A2 G1, general shot (film 42.35)
- 19** A2 G1, general shot (film 43.5)
- 20** Service lift accessed from corridor A2 G3 (film 42.37)
- 21** A2 B1, general shot (film 42.25)
- 22** A2 B2, general shot (film 42.23)
- 23** Sign outside former 'Projector No. 4' room, A2.1 B2 (film 42.27)
- 24** Former 'Projector No. 4' room, A2.1 B2 (film 42.29)
- 25** To rear of former projectors no. 1 and no. 2, A2.1 B1 (film 42.31)
- 26** Stair flight leading up to A2 G3 (film 42.33)
- 27** South elevation of A3 (film 5.3)
- 28** South elevation of A3 (film 5.5)
- 29** North elevation of A3.1 (centre and right) and A3 (behind) (film 9.10)

- 30 North elevation of A3 (film 10.1)
- 31 A3 G4, general shot (film 42.15)
- 32 A3 G3, general shot (film 42.17)
- 33 A3 G3, general shot (film 42.19)
- 34 A3 G1, general shot (film 42.21)
- 35 Main door, A4 (film 2.5)
- 36 South elevation of A4 (film 5.8)
- 37 South elevation of A4 (film 5.10)
- 38 South elevation of A4 (film 6.1)
- 39 South elevation of A4 (film 6.4)
- 40 West elevation of A4 (A4.1 to left) (film 8.9)
- 41 North elevation of A4 and A4.1 (film 9.1)
- 42 North elevation of A4 (film 9.4)
- 43 North elevation of A4.2 (foreground) and A4 (behind) (film 9.6)
- 44 North elevation of A4 (A3.1 to extreme left) (film 9.7)
- 45 A4 G7, stairwell (film 34.5)
- 46 A4.1 G1, blocked window (film 34.7)
- 47 A4 G8, general shot showing hatch beyond in A4G7 (film 34.9)
- 48 Tiles on wall of A4 G7/A4 F2 stairwell (film 35.7)
- 49 Tiles on A4 G7/A4 F2 stairwell (film 35.9)
- 50 A4 G7, mosaic floor (film 50.35)
- 51 A4 G7, mosaic floor (film 50.36)
- 52 A4 G7, mosaic floor (film 42.3)
- 53 Building A4 G7, mosaic floor detail (film 51.3)
- 54 A4 G4, general shot (film 42.5)
- 55 A4 G3, general shot (film 42.7)
- 56 A4 G2, general shot (film 42.9)
- 57 Stairwell A4 G2, down to A4 B7 (film 42.11)
- 58 A4 G1, general shot (film 42.13)
- 59 A4 F1, safe (film 35.1)
- 60 A4 F1, panelled door (film 35.3)
- 61 A4 F1, original ceiling coving and panelling (film 35.5)
- 62 A4 F1, ceiling coving and panelled dais over stairs, after removal of cupboard (film 51.5)
- 63 A4 F3, general shot (film 43.15)
- 64 A4 F4, general shot (film 43.17)

- 65 A4 F5, general shot (film 43.19)
- 66 A4 F6, general shot (film 43.23)
- 67 A4 F5, panelled door (film 43.21)
- 68 A4 F7, general shot (film 43.27)
- 69 A4 F7, panelled door and coving (film 43.29)
- 70 Under-stair cupboard A4 F7 (film 43.33)
- 71 A4 F6, office ceiling vent after removal of ceiling (film 51.7)
- 72 A4 F8, general shot (film 43.31)
- 73 A4 F9, general shot (film 43.35)
- 74 General shot of stairwell A4 F3 (film 43.37)
- 75 A4 S3, general shot (film 44.7)
- 76 A4 S1 (toilet), general shot (film 44.3)
- 77 A4 S2, general shot (film 44.5)
- 78 A4 S3, blacked-out window (film 44.9)
- 79 Corridor A4 F4, composite beam in floor (film 51.9)
- 80 Stairwell A4.2 G2, down to A4 B7 (film 44.11)
- 81 A4 B7, general shot (film 44.17)
- 82 A4 B8, general shot (film 44.15)
- 83 A4 B6, general shot (film 44.19)
- 84 A4 B4, general shot (film 44.23)
- 85 A4 B2, general shot (film 44.26)
- 86 A4 B3, door of Milner's strong room (film 44.25)
- 87 A4 B5, general shot (film 44.21)
- 88 A4 B1, general shot (film 44.27)
- 89 A4 B1, general shot (film 44.29)
- 90 Stairwell from A4 B7 up to A4 G9 (film 44.31)
- 91 A4 G9, stair head showing metal plate walls from former safe (film 44.33)
- 92 South elevation of B1 (film 2.3)
- 93 East elevation of B1 (film 6.9)
- 94 North elevation of B1 with B2 to right (film 7.3)
- 95 B1 B1, general shot (film 46.17)
- 96 B1 B2, general shot (film 46.19)
- 97 B1 G1, general shot (film 45.15)
- 98 B1 G2, general shot (film 45.17)
- 99 Stair B1 G3 up to B1 F1, general shot (film 45.19)
- 100 B1 G3, panelling detail (film 45.21)

- 101** B1 F2, general shot (film 45.25)
- 102** B1 F2, window detail (film 45.27)
- 103** South elevation of B2 (film 2.1)
- 104** North elevation of B2 (film 7.5)
- 105** North elevation of B2 (left) and B2.1 (right) (film 7.7)
- 106** B2 G1, general shot (film 44.35)
- 107** B2 G1, coving detail (film 45.5)
- 108** B2 G2, general shot (film 45.7)
- 109** B2 G2, coving detail (film 45.9)
- 110** B2 G3, general shot (film 45.11)
- 111** B2 G3, coving detail (film 45.13)
- 112** B2 G4, general shot (film 46.5)
- 113** B2.1 G1 and B2 G5, general shot (film 46.7)
- 114** B2.1 G1, window (film 46.9)
- 115** B2.1 G1, optical instrument (film 46.11)
- 116** B2 F1 and B1 F1, general shot (film 45.23)
- 117** B2.1 F1, general shot (film 46.27)
- 118** B1 F3/B2 F2, general shot (film 45.29)
- 119** B2 F3, general shot (film 45.31)
- 120** Stairway from B2 F1 to B2 S1 (film 45.33)
- 121** B2 S1, general shot (film 45.35)
- 122** B2 S1, window (film 46.3)
- 123** B2.1 S1, general shot (film 46.25)
- 124** B2 B1, general shot (film 46.13)
- 125** B2 B2, general shot (film 46.15)
- 126** South elevation of B3 (film 1.10)
- 127** North elevation of B2.1 (left) and B3 (right) (film 7.9)
- 128** North elevation of B3 (film 8.1)
- 129** North elevation of B3 (film 8.3)
- 130** B3 G1, general shot (film 38.7)
- 131** B3 F6, general shot (film 39.3)
- 132** B3 F4, general shot (film 39.5)
- 133** B3 F1/B2 F4, general shot (film 39.9)
- 134** B3 F3, general shot (film 46.21)
- 135** B3 F2, general shot (film 46.23)
- 136** South elevation of B4 (film 1.4)

- 137** South elevation of B4 (film 1.6)
- 138** South elevation of B4 (film 1.8)
- 139** North elevation of B4 (film 8.5)
- 140** North elevation of B4 (film 8.7)
- 141** B4, G1 general shot (film 40.1)
- 142** B4, G1 general shot (film 40.3)
- 143** B4 F2, general shot (film 38.9)
- 144** B4 F1, general shot (film 39.1)
- 145** North elevation of B5 (film 18.8)
- 146** Northeast elevation of B5 (film 18.10)
- 147** East elevation of B5 (film 19.1)
- 148** East elevation of B5 (film 19.4)
- 149** B5, G1, general shot (film 32.7)
- 150** B5, G1, general shot (film 32.9)
- 151** B5, flange of inserted universal column within brick pier (film 50.3)
- 152** B5, upper part of roof truss (film 50.7)
- 153** B5, junction at roof truss shoulder (film 50.5)
- 154** B5, shot showing roof truss structure (film 50.9)
- 155** B5 roof truss, junction of struts and king-rod (film 50.11)
- 156** B5 roof truss, junction of struts and king-rod (film 50.13)
- 157** B5 roof truss, junction of rod and strut (film 50.17)
- 158** B5, junction of strut and rod with principal rafter (film 50.15)
- 159** B5 roof truss, rod (film 50.19)
- 160** B5, intersection of roof truss with pier (film 50.21)
- 161** B5 roof truss, battens for slates on principal rafter (film 50.23)
- 162** General view of C1 (foreground) with I1.1 and I1 behind (film 17.3)
- 163** East elevation of C1.1 (film 18.3)
- 164** C1.1 G5, general shot (film 33.7)
- 165** C1.1 G4, general shot (film 48.3)
- 166** C1.1 G1, general shot (film 48.5)
- 167** C1.1 G2, general shot (film 48.7)
- 168** C1.1 G4, general shot (film 48.9)
- 169** C1.1 G4, general shot (film 48.11)
- 170** C1 G1 (film 48.13)
- 171** C1 G3, general shot (film 33.9)
- 172** C1 G3 (film 48.15)

- 173** West elevation of D1 (film 18.5)
- 174** South elevation of D1 (film 19.5)
- 175** North elevation of D1 (film 20.1)
- 176** D1 G6, stairwell (film 27.1)
- 177** D1 G1, general shot (film 27.10)
- 178** D1 G1, electrical cabinets (film 28.1)
- 179** D1 G1, general shot (film 28.3)
- 180** D1 F1, general shot (film 27.3)
- 181** D1 F1, general shot (film 27.5)
- 182** D1 F1, stairwell (film 27.7)

VOLUME 4 (photographic plates)

- 183** Building E1, datestone detail (film 2.10)
- 184** South elevation of E1 (film 20.3)
- 185** South elevation of E1 (film 20.6)
- 186** East elevation of Building E1, gable of former engine house (film 21.7)
- 187** View between I1/I1.2 (left), D1 (right), with former engine house E1 G6 beyond (film 18.1)
- 188** View between D1 (left) and E1 (right), showing I2 and I2.2 beyond (film 19.7)
- 189** View between D1 (right) and E1 (left), with B3 beyond (film 19.10)
- 190** E1.1 G1, general shot (film 24.1)
- 191** E1 G8, general shot (film 24.3)
- 192** E1 G4, general shot (film 24.5)
- 193** E1 G5, general shot (film 24.7)
- 194** E1 G5, general shot (film 24.9)
- 195** E1 G5, general shot (film 25.3)
- 196** E1 G5, roof detail (film 25.7)
- 197** E1 G5, detail of column and lattice truss (film 26.5)
- 198** E1 G5, column head and girders (film 51.11)
- 199** E1 G5, intersection of roof truss with wall plate (film 51.13)
- 200** E1 G5, intersection of strut and rod in roof truss (film 51.15)
- 201** E1 G5, rod in roof truss (film 51.17)
- 202** E1 G5, junction at roof truss shoulder (film 51.19)
- 203** E1 G5, general shot of truss (film 51.21)

- 204** E1 G5, intersection of king-rod and struts, roof truss (film 51.23)
- 205** E1 G6, general shot (film 25.5)
- 206** E1 G7, general shot (film 25.1)
- 207** Former engine house E1 G7, general exterior view (film 26.1)
- 208** Former engine house E1 G7, detail of blocked doorways (film 25.10)
- 209** E1 G3, roof detail (film 26.7)
- 210** E1 G3, detail of lattice truss (film 26.9)
- 211** Window in upper storey of former engine house (over E1 G6) (film 50.27)
- 212** Window in upper storey of former engine house (over E1 G6) (film 50.29)
- 213** Upper storey of former engine house (over E1 G6), general shot (film 50.31)
- 214** Upper storey of former engine house (over E1 G6), general shot (film 50.33)
- 215** South elevation of F1 (film 20.7)
- 216** F1, general shot (film 20.10)
- 217** East elevation of F1 (left) and F1.3 (right) (film 21.1)
- 218** East elevation of F1.2 (centre) and G1 (right) (film 21.4)
- 219** North elevation of F1.2 (film 21.5)
- 220** F1 G3, general shot (film 41.7)
- 221** F1 G3, general shot (film 41.10)
- 222** F1.2 G1, general shot (film 48.17)
- 223** F1.2 G2, general shot (film 48.19)
- 224** F1.2 G3, general shot (film 48.21)
- 225** F1 G3, general shot (film 48.23)
- 226** F1 G2, general shot (film 48.25)
- 227** F1 F1, general shot (film 48.27)
- 228** F1 F2, general shot (film 48.29)
- 229** F1.3 F1, general shot (film 48.31)
- 230** F1.2 F1, general shot (film 48.33)
- 231** F1.2 F1, general shot (film 48.35)
- 232** F1.2 F1, heated lockers (film 41.5)
- 233** F1.2 F1, locker detail (film 48.36)
- 234** West elevation of G1.3 (G1.2 to extreme left) (film 22.4)
- 235** South elevations of G1.3 (centre) and G1 (right) (film 22.6)
- 236** South elevation of G1 (film 22.8)
- 237** South elevation of G1 (film 22.10)

- 238** East elevation of G1 (film 23.1)
- 239** East elevation of G1 (film 23.4)
- 240** East elevation of G1 (film 23.5)
- 241** East elevation of G1 (film 23.8)
- 242** General shot of G1.1 (centre and left) and G1.2 (extreme right) from northwest (film 37.9)
- 243** G1.1, detail of column and lattice girder in east wall (film 40.7)
- 244** G1, detail of surviving wrought iron truss encased within later roof (film 40.9)
- 245** G1.1, roof structure (film 41.1)
- 246** Truncated shoulder of roof truss, architectural fragment of demolished building G1.1 (film 52. 5)
- 247** Truncated column, architectural fragment of demolished building G1 (film 52.7)
- 248** Truncated column, architectural fragment of demolished building G1 (film 52.9)
- 249** Lattice girder, architectural fragment of demolished building G1 (film 52.11)
- 250** King-rod and strut union, from demolished building G1.1 (film 52.3)
- 251** I4/G1.1, column (film 52.13)
- 252** I4/G1.1, column (film 52.17)
- 253** I4/G1.1, detail, column head and truncated lattice girder (film 52.19)
- 254** General shot, east elevation of G1 (film 23.10)
- 255** G1.3, general shot of interior (film 37.5)
- 256** G1.3, extractors (film 37.7)
- 257** G1, general shot (film 38.5)
- 258** G1, column and truncated lattice girder in south gable (film 40.5)
- 259** G1, column and old roof truss (film 41.3)
- 260** East elevation of H1/H1.1/H1.2, with H2/H2.1 in front (film 4.5)
- 261** Copings on canal wall and Building H2/H2.1 (film 49.9)
- 262** East elevation of H1/H1.1/H1.2 (film 11.3)
- 263** West elevation of H1 (film 11.5)
- 264** West elevation of H1/H1.1/H1.2 (film 11.7)
- 265** North elevation of H1 (film 12.1)
- 266** North elevation of H1 (film 12.3)
- 267** South elevation of H1.2 (film 11.1)

- 268** H1, general shot (film 33.1)
- 269** H1.1/H1.2, general shot (film 33.3)
- 270** H1/H1.1/H1.2, roof detail (film 33.5)
- 271** H1, furnace (film 34.1)
- 272** H1, round furnace (film 34.3)
- 273** West elevation of I1 (film 17.5)
- 274** West elevation of I1.1 and I1 (film 17.7)
- 275** Southwest corner of I1 (film 17.9)
- 276** North elevation of I4.3 (left) and east elevation of I6 G5 (film 14.9)
- 277** North elevation of I4.3 (film 14.3)
- 278** View of archways, plus I4.3 (right) and I5 beyond (centre) (film 14.7)
- 279** North elevation of I5 with east end of I4.3/I4.2 to right (film 14.1)
- 280** South elevation of I3 (film 21.10)
- 281** South elevation of I4 with G1.2 to right (film 22.1)
- 282** East elevation of I4.4 with I 4 to rear (film 12.5)
- 283** South elevation of I5 (film 12.7)
- 284** South elevation of I5 (film 11.10)
- 285** East elevation of I5 (film 12.10)
- 286** I1, general shot (film 28.5)
- 287** Column between I1 and I1.1 (film 28.7)
- 288** Building I1, general shot of roof truss during demolition (film 51.27)
- 289** Building I1, general shot of roof truss during demolition (film 51.29)
- 290** Building I1, column during demolition (film 51.31)
- 291** Building I1, column head during demolition (film 51.33)
- 292** Building I1, west gable during demolition (film 51.35)
- 293** Building I1, detail of tie-rod on west gable during demolition (film 51.36)
- 294** Building I2.1/I2.2/I2.3/i2.4, general shot looking west (film 36.7)
- 295** Building I2.1/I2.2/I2.3/I2.4 general shot looking east (film 28.9)
- 296** I2.4, furnace (film 31.9)
- 297** I2.2, roof structure (film 31.5)
- 298** I2.2 roof structure, with i3.2 and I4.2 beyond (film 29.1)
- 299** I3/I3.1/I3.2 and I4/I4.1/I4.2, general shot looking south east (film 29.3)
- 300** I3 (front) and I4 (rear), general shot looking east (film 29.5)
- 301** I3 (front) and I4 (rear), general roof shot looking east (film 29.9)
- 302** I3, roof truss (film 30.1)
- 303** I3, detail of crane at west end (film 37.1)

- 304** I3, detail of structures beneath crane at west end, with engine house (E1 G7) beyond (film 37.3)
- 305** I3, girder and change in roof structure (film 31.3)
- 306** I3.1, detail of truncated girder (film 26.4)
- 307** I4, roof structure detail (film 30.7)
- 308** I4.4 (former engine house), west elevation (film 30.3)
- 309** I4.4 (north elevation), of former engine house (film 30.5)
- 310** I4.4 interior, general shot (film 31.1)
- 311** I2.2/I3.2/I4.2/I5, general shot (film 36.10)
- 312** I4.1, general shot looking west (film 38.3)
- 313** I5, pit in floor (film 30.9)
- 314** I5, general view, showing overhead crane and holes in floor (film 38.1)
- 315** North elevation of I6, seen through archway (film 15.9)
- 316** View to east, with archways to north and I6 to south (film 16.1)
- 317** North elevation of I6 (film 16.3)
- 318** Northwest corner of I6 (film 16.5)
- 319** West elevation of I6 (film 16.10)
- 320** South elevation of I6 (film 17.1)
- 321** I6 G1, general shot (film 32.3)
- 322** I6 G2, general shot (film 32.1)
- 323** I6 G3, general shot (film 32.5)
- 324** I6 G4, general shot (film 31.7)
- 325** East elevation of J1/J1.1 with building I5 beyond (film 4.7)
- 326** West elevation of J1/J1.1 (film 13.3)
- 327** J1, tanks on roof (film 49.5)
- 328** J1, riveted girder on roof (film 49.7)
- 329** J1.1, internal arch (south wall of J1) (film 49.11)
- 330** J1.1, general view (film 49.13)
- 331** J1, general view (film 49.15)
- 332** J1, general view (film 49.17)
- 333** K1, general shot (film 46.29)
- 334** K1.1, general shot (film 46.31)
- 335** K1.2, general shot (film 46.33)
- 336** K1.3, general shot (film 46.35)
- 337** Workshop in K1.3, general shot (47.3)
- 338** Workshop in K1.4, general shot (film 47.5)

- 339** K1.5, general shot (film 47.9)
- 340** K1.6, general shot (film 47.11)
- 341** K1.7, general shot (film 47.15)
- 342** K1.9, general shot (film 47.17)
- 343** K1.10, general shot (film 47. 21)
- 344** K1.11, general shot (film 47.23)
- 345** K1.12, general shot (film 47.25)
- 346** K1.14, general shot (film 47.27)
- 347** K1.13, general shot (film 47.29)
- 348** K1.15, general shot (film 47.31)
- 349** South elevation of K1 (film 16.8)
- 350** North elevation of archways K1.2-K1.4 (film 15.3)
- 351** North elevation of K1.2-K1.4 (film 15.5)
- 352** South elevation of archways, with north elevation of archways K1.2-K1.4 to right (film 15.7)
- 353** Workshop in K1.3 (film 46.37)
- 354** K1.4, overhead cranes (film 47.7)
- 355** Drop hammer to the north of archway K1.5 (film 36.1)
- 356** Large tank, K1.5 (film 15.1)
- 357** Workshop in K1.6 (film 47.13)
- 358** K1.8, stanchion and timber upright (film 36.3)
- 359** K1.8, timber roof structure (film 36.5)
- 360** K1.8, stanchion for crane and timber upright for supporting roof (film 47.33)
- 361** K1.8, roof structure and crane (film 47.35)
- 362** K1.9, overhead crane (film 47.19)
- 363** South elevation of K1.8, K1.9 and K1.10 (film 14.5)
- 364** South elevation of K1.13 (film 13.9)
- 365** South elevation of K1.15 (film 13.5)
- 366** View east along archways (arch K1.15 to right) (film 13.7)
- 367** West elevation of canal boundary wall, showing blocked arch (film 13.1)
- 368** Photograph of 1855 painting of Monk Bridge Forge, by Mr.Widdas
- 369** Detail of Whitehall Road range on 1855 painting of Monk Bridge Forge
- 370** Detail of canal gate on 1855 painting of Monk Bridge Forge
- 371** Detail of chimney arrangement on 1855 painting of Monk Bridge Forge

372 Detail of interior of puddling shed on 1855 painting of Monk Bridge Forge

NON-TECHNICAL SUMMARY

ARCUS were commissioned in December 2005, by RPS Planning & Environment, on behalf of their client HBG Properties, to undertake a programme of archaeological building recording at the site of the former Monk Bridge Forge, Whitehall Road, Holbeck, Leeds, West Yorkshire (NGR SE 2903 3307).

The owners of the site have obtained planning consent to redevelop the site through the construction of residential and retail premises. The redevelopment entailed the demolition of all of the buildings currently occupying the site, and although it was not a planning requirement, a programme of recording was agreed with the West Yorkshire Archaeology Advisory Service (WYAAS).

The fieldwork and archive research was completed in March 2006, and included the compilation of room data sheets, a comprehensive photographic survey, the measured survey of a number of selective floor plans, sections and elevations. Archive research and an analysis of available map evidence were also undertaken, and a watching brief was carried out during demolition.

The development of Monk Bridge Forge by the Kitsons during the 1850s-70s, firmly established it as one of the key suppliers of high quality forgings for the expanding locomotive industry. By 1900 its products were being shipped all over the world and renowned as a market leader. The Government took control to varying degrees during the 1920s-1940s, with sales boosted by military requirements. Its prominence, however, had declined by 1949 when it closed. Doncasters of Sheffield bought the site in 1951 and the following extensive modernisation in the 1950s-60s output was concentrated upon the production of turbine blades for 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. None can stand alone as being considered of national importance, however in terms of the regional and local significance they are more marked. Those that are either massive workshop spaces, or production sheds, making effective use of both wrought roof trusses and cast iron columns to construct large and spacious buildings, are of particular

interest. The nineteenth-century offices are also of interest, with external architectural detailing and internal tiles manufactured locally at Burmantofts.

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 twentieth century, which is reflected in the appearance of such buildings on the site from the 1950s onwards.

This survey has also 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.

The discovery of a painting of the site dated 1855 has provided additional evidence for the layout and former working practices undertaken in the early years of Monk Bridge Forge.

1 INTRODUCTION

ARCUS were commissioned in December 2005, by RPS Planning & Environment, on behalf of their client HBG Properties, to undertake a programme of archaeological building recording at the site of the former Doncaster' s, Monk Bridge Forge, Whitehall Road, Holbeck, Leeds, West Yorkshire (**Illustration 1**).

The owners have obtained planning consent to redevelop the site through the construction of residential and retail premises. The present programme of recording was not a planning requirement, but was specified by RPS and West Yorkshire Archaeology Advisory Service (WYAAS).

2 AIMS AND METHODOLOGY

2.1 Project Aims and Rationale

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 recording on site 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 (3rd Edition)* and EH (2006)
- In addition to the recording of the structures on site an examination was also made of the archive that survived on site, which principally consisted of building plans and engineering drawings
- A visit was made to the Leeds archives in Sheepscar

2.3 Fieldwork Programme

The project was managed by James Symonds (ARCUS Director). The fieldwork programme was supervised by Oliver Jessop MIFA (ARCUS Project Manager), and carried out in March 2006. Archaeological building recording was undertaken by Mark Douglas, Stephen Duckworth, Alex Rose-Deacon, Lucy Dawson and Howard Whiting (ARCUS Archaeologists), photography by Simon Jessop (ARCUS Photographer) and archive research by Stephen Duckworth.

Reporting was by Oliver Jessop and Mark Douglas, with contributions by Stephen Duckworth.

2.4 Site Location and Current Land Use

The site is located approximately 1km to the south-west of Leeds city centre at NGR SE 2903 3307 (**Illustration 1**). The area of Holbeck where the site is situated is a formerly heavily industrialised part of Leeds and the site itself is only approximately half of the original extent of the works, with the remainder

(now largely demolished) being situated on the opposite side of Whitehall Road. The area of the Doncasters' site which is the focus of this report 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-nineteenth to the late twentieth century. They consist of brick-built office and workshop ranges and large steel framed sheds.

2.5 Previous Survey

Doncasters' site, 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, 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 engineers and architectural drawings for this part of the site.

- 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 of the former works that spanned both sides of Whitehall Road, however the focus of this report is on the northern part of the Works and they are used as a means of general reference only.

3 HISTORICAL BACKGROUND

3.1 Historical Context of Monk Bridge Forge

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 fourteenth century.

From c1350 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 sixteenth century. At this early date, some of the larger Leeds clothiers were employing twenty 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 eighteenth 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 eighteenth-century improvements included the improvement of the River Aire Navigation by an Act of 1774. At the same time, improved trans-Pennine communication links were sought, such as the 1770 Act promoting the Leeds to Liverpool canal, although this was not completed until 1816.

During the late eighteenth 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 Monk Bridge.

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 eighteenth 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 eighteenth century, Monk Bridge became a location at the centre of a number of 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, just east of Monk Bridge. 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 nineteenth century, the local railway network grew, with George Hudson's North Midland Railway from Derby reaching its initial Hunslet terminus in the mid 1840s, at the same time as the Leeds and Bradford Railway bridged the River Aire and Leeds to Liverpool Canal at Monk Bridge.

The rapid proliferation of lines during 'The Railway Mania' resulted in a much-increased demand for steam locomotives, both to run on the main lines and the various connected industrial systems at collieries, ironworks and other sites. The established 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 the nucleation in Hunslet of several firms specialising in the production of industrial locomotives, often relatively small but with larger engines built for export markets.

The origin of Monk Bridge Forge lay in the expansion of Leeds' locomotive-building industry and is directly 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 re-named 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. In 1839 a number of them had already established a locomotive works, Todd, Kitson and Laird, nearby in Hunslet, near the North Midland Railway terminus.

Todd, Kitson and Laird soon broke up, spawning two new and ultimately long-lived firms: Kitson and Laird established themselves at the Airedale Foundry, becoming Kitson & Company from 1863; Shepherd and Todd built a works across the road from Kitson and Laird, which in 1847 became the Railway Foundry of E.B.Wilson and Company.

E.B.Wilson and Company was wound up in 1858, some of its employees thence creating Manning Wardle & Co., who built their Boyne Works on land leased from Lord Boyne, north of E.B.Wilson's Railway Foundry. The latter site was demolished, being replaced in 1860 by the New Railway Foundry of Hudswell Clarke & Co.

Finally, in 1864, John T. Leather established the Hunslet Engine Company immediately east of Manning Wardle's Boyne Works, to complete the quartet of neighbouring locomotive-building firms sited on, or near, Jack Lane, Hunslet.

3.2 The Monk Bridge Steel and Iron Works

Against the background of a thriving local engine-building industry, The Monk Bridge Forge was founded in June 1851 by Stephen Witham, producing the highest-quality wrought iron ("Best Yorkshire Iron" , or "Monk Bridge best Yorkshire" grade), which was necessary to withstand the twisting forces encountered in steam locomotive crank axles, coupling and piston rods.

The works appears to have been an immediate success and was purchased by James Kitson in September 1854 for his two sons. In addition, he was able to safeguard their supply of quality iron (and later steel) for locomotive engineering purposes, which included an important export market to South America, Africa, East Indies and former UK colonies.

Under the Kitsons, steel-making was introduced, initially for the early manufacture of tyres for locomotives. The growth in demand for quality steel 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 4**).

In 1886 the Monk Bridge Iron & 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 1900, 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 in Business c.1990, 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, 27).

With the introduction of the Siemens Martin Open Hearth Acid method of steel making, Monk Bridge quickly realised its value 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 – Cont. Sketches c.1900, 28). An hydraulic forging press of 1200 tons capacity added in 1890.

On the death of Sir James Kitson in 1911 the company 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 Monk Bridge works survived the depressions and closures of the 20's and 30'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. Doncasters had grown during the 1940s into a leading supplier of forged steel tools & valves to the automotive industry and today it 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 air-liner 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 Monk Bridge 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.

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 at Monk Bridge.

By the end of the twentieth century the southern (former steel works) half of the site had become redundant and the buildings were demolished. By 2005,

the remaining northern operations had been relocated to Sheffield and Wales and the land sold for redevelopment.

3.3 Summary of Key Historical Dates and Events

Date	Event
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1851	Stephen Witham establishes a forge on the site in order to supply the local demand for high quality iron.
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1854	the Monk Bridge Ironworks is purchased by James Kitson for the sum of £21,500. Two additional plots of land are purchased further to the west.
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1858	by this date the works had expanded to cover the full extent of the land under Kitson' s ownership.
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1864	further land was purchased to the south of Whitehall Road for the construction of a steelworks.
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1886	the conversion of the Monk Bridge Iron and Steel Company into a private limited company took place.
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1914	the works was taken under government control for the duration of the First World War.
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1940	the works was again taken under government control.
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1949	the works was closed and the company wound up.
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1951	the site was purchased by Doncasters of Sheffield and rapidly became the centre for the production of forged turbine blades.
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1960s	existing buildings were redeveloped and new workshops built
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2005	the Monk Bridge site was closed and production transferred to sites in Sheffield and Wales.
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3.4 Historical Archives

Discarded within one of the former drawing offices on the site (room B2F3), a significant quantity of illustrations, plans, section, elevations, planning submissions and engineering constructional drawings were examined. This material has been removed by Leeds archives, although the opportunity was taken during fieldwork to digitally scan a selection of the illustrations, which are included in section 10 of this report. In addition, deposited plans for the

site held in the Leeds archives in Sheepscar were consulted, along with secondary sources relating to the works.

3.5 1855 Painting of Monk Bridge Forge

A painting presented to Mr Kitson in 1855 was examined as part of this programme of archaeological survey. It was photographed (**Plates 368-372**) in October 2006 at the Head Office of Doncasters in Melbourne, Derbyshire. The picture hangs in the company boardroom and is heavily discoloured, being hidden behind thick glass.

The painting has two pages of type on the reverse, a transcript is as follows (undecipherable words represented with '?'):

The Monk Bridge Iron Works

Presentation to Stephen Witham Esq

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

Mr Witham being deeply affected by such a token of regard from his late devoted workmen could not sufficiently express what he intended, so in the arrangement of the whole of the workmen, about 100, should have 1000 at the expense at Mr. Bent's Cordains. At Mr. 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 Witham 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.

The frontage range of brick buildings overlooking Whitehall Road correlates with the 1858 map (**Illustration 3**). The orientation of the rolling mill (Building G) dominates the central part of the site, which has a brick end gable pierced by arched openings and a high oculus vent in a raised gable. There are slate roofs and a continuous clearstory ridge vent. It is also interesting to note that there is a covered roof linking Building G with the frontage range. A metal truss of a similar design to those in Buildings G1 and B5 (**Plate 369**) is clearly illustrated below a curved roof. Beyond this building another brick range may represent the early north-south range demolished apparently demolished by the 1860s (**Illustration 4**).

The northern part of the painting is dominated by the pair of brick puddling sheds (**Plate 368**). These both have brick gables with large arched openings, oculus vents and a continuous clearstory ridge vent identical to Buildings, E, G and I1 (**Plate 273**). There is a row of three large circular chimneys between the puddling sheds and smaller ancillary chimneys which are square in plan along the outer edges of each range. Within each of the canal side arches figures have been illustrated actually working at each of the puddling furnaces. The ground to the north is black, and may have been a area for dumping spent fuel, and also as a storage area for fuel delivered by canal barge from local collieries.

The painting has proved a fascinating insight into the appearance of the early years of the forge and has enabled confirmation of the overall design and appearance of both the puddling sheds and rolling mill.

4 BUILDING DESCRIPTIONS

4.1 Introduction

Each of the standing buildings at Monk Bridge Forge 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 evidence presented within previous surveys (Kinchen-Smith 2005 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 record historic features

(Appendix I), less attention is placed upon buildings from the post-war period – 1950 to 2000.

4.2 Site Orientation

The southern boundary to the site demarked by Whitehall road is orientated west-east and the eastern edge is defined by the Leeds and Liverpool Canal, orientated north-south (**Illustration 2**). The layout of the building groups A-K conform to a layout that respects these boundaries, with only a few buildings along the angled western boundary that are orientated, or have walls on a northwest-southeast orientation.

4.3 Building Descriptions

Building A1

Building A1 is located at the eastern end of the south range of buildings that front on to Whitehall Road (**Illustration 2**). It has a rectangular footprint and measures 7m x 6m. Ground floor pedestrian access is from road level and there is a lower level rail access tunnel (now blocked), or subway beneath the road leading to the former south section of the works.

It is built from brick and has a dentillated eaves course on the north and south elevations, a design detail on other building on the site from the earliest phase of the forge. The pitched slate roof has no evidence for former chimney stacks. The south elevation is divided into three bays (**Plate 8**), the eastern two contain rectangular windows (blocked) under stone lintels, with chamfered stone sills. The western bay contains a double opening (blocked) under a concrete lintel (all blockings are modern brick). The east elevation contains a single window (blocked) with a stone lintel and with brick sill (**Plate 7**). The north elevation is two storeys in height due to the subway below (**Plate 9**), however the upper level (ground floor) has three window bays with brick sills and one door bay, all under concrete lintels. The east window was formerly door, shown as such on factory plan of c1957-64 (**Illustration 17**).

The interior of this building has been heavily modernised, with the insertion of suspended ceilings, replaced windows and internal partitions. It has been converted from a single room into two, A1G1 (**Plate 11**) and A1G2, with front and rear access provided by an external steel walkway above the access tunnel.

The former rail access tunnel/subway, A1B1, was blocked at the time of survey (**Plate 9**) and not examined in detail.

Building A2 & A2.1

Building A2 (**Illustration 20**) is a small two storey building forming part of the Whitehall Road frontage, located between Buildings A1 and A3. It measures 12.5m x 5.5m and is single storey building fronting the road, although has a basement level towards to the north. It is built in brick and has a flat roof.

The south elevation (**Plate 12**) has five window bays, with concrete lintels and sills. The brickwork can be divided into three phases of construction. The lower two-three courses are part of the earliest phase on the site (mid-nineteenth century), whilst the main body of the wall and windows are early twentieth century (phase 3), whilst the upper courses above the windows and roof are c.1950s-60s (phase 5).

The north elevation is two storeys (**Plates 13,14**). It can be divided into two phases of construction, with the lower storey dating to phase 1 and the upper, phase 3. The elevation can be divided into two sections. The eastern section (**Plate 13**) has three window bays, each window having bull-nose brick sills and soldier lintels, at ground and first floors. The western part of the elevation is set back (**Illustration 20**), being only one room deep (**Plate 14**). Centrally located is a projecting brick lift tower. On either side are access doorways, the western leading up to the first floor, whilst the eastern provides access to the basement level. At the upper level (ground floor) there are windows above each doorway, with soldier brick lintels. The window to the east has a wooden base panel without a sill.

The west elevation is blind (**Plate 14**), whilst the east has a single doorway leading to a small store (A2.1B3) at basement level and a wide window at ground level above, with a concrete lintel and rounded bull-nose brick sill (**Plate 13**).

The internal arrangement (**Illustration 20**) at basement level comprises a single large room, A2B2 (**Plate 22**) with a small room, A2B1 (**Plate 21**) to the east along the south of the building, with 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 a dog-leg stair leading to the first floor.

The first floor can be divided into a large room, A2G1, with four windows along the south of the building (**Plates 15,18**). This is separated from the other rooms by an '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**).

Building A3 and A3.1

Building A3 (**Illustration 20**) is a single storey brick-built structure, that fronts onto Whitehall Road between Buildings A2 and A4 (**plates 27,28**). It measures 23m x 6m and has a pitched slate covered roof. The south elevation has six window bays, with gable on 4th bay from west (plate 27). There are square brickwork dentils under the eaves, and a stone string-course at transom level of the windows. The windows have stone sills, although the lintels have been replaced in concrete. The window in the gable bay has a stone transom and segmental brick head. The building dates to phase 1.

The north elevation is rendered brick (**plate 30**) with a dentiled eaves course. There are five external bay divisions, with two narrow blocked doors with inserted high level windows to the east. There remaining three windows have stone sills, although the central one has been partially truncated, by the insertion of a double access door. Above the fifth window from the east is a gable similar to the south elevation with a rounded headed window and stone sill. In addition, built against the western end is a single-storey, pent-roofed brick outshut used as a store (**plate 29**). It has a slate roof and measures 6m x 2m.

The building is one room deep and subdivided into three interconnected rooms of unequal size and one and a half storeys in height. The east room A3G1 is the smallest (**Plate 34**), with a modern subdivision towards the north A3G2. The central room A3G3 (**Plates 32,33**) is the largest and has inserted double doors in the north elevation. The western room (**Plate 31**) has an inserted suspended ceiling and has direct access into Building A4 to the west.

Building A4, A4.1 and A4.2

Building A4 (**Plate 1**) is a substantial two and three storey brick-built range with terracotta detail to the windows and doors. It fronts onto Whitehall Road and contained the company offices (**Illustration 9**). The upper storeys of the building are dated to the 1890' s (phase 2), however, the ground floor relates to phase 1, contemporary with Buildings A3, A2 (lower section) and A1. It

would have been within the central part of a long linear frontage (**Illustration 4**), which has been truncated from the western section (Buildings B1-B4) by the demolition of the arched entrance gateway in the 1980s (**Plate 39**).

The building has a rectangular footprint, measuring 38m x 8m (**Illustration 20**), with a slate roof and has two projecting outshuts, A4.1 and A4.2, to the rear. The south elevation overlooking the road (**Plates 36-38**) has thirteen window bays, with gables over bays 1-2, 8-9 and 13 (from the west). The ground floor windows (phase 1) all have projecting stone sills and have segmental brick heads, whilst the later (phase 2) windows to the upper floors have moulded terracotta window surrounds with flat arched terracotta joggled segmental heads. The Gable copings are terracotta, along with ball finials and string course details.

The addition of the upper floors occurred in the 1890s, following the submission of a design by Chorley and Cowan (Fitzgerald 2004, fig.16a) and submitted for planning in 1891. The exterior of the building exhibits some architectural pretensions, and is in keeping with a restrained arts and crafts style popular at this time. The main south entrance door of the building (**Plate 35**) was refashioned at the same time as the construction of the upper floors. It is set beneath a terracotta round-headed arch, complete with hood mould and a continuous roll moulding running down the jambs. The head of the doorway arch breaks the earlier ashlar string course and there are prominent vertical joints running down either side of the inserted doorway.

The west elevation (**plate 40**) is covered with render, however it marks the position of an arched passageway leading into the site.

The north elevation has an irregular bay structure (**Plates 41-44**). The centre section of elevation breaks forward with inset loading bay at ground floor, with weather-boarded second storey over. The treatment of this elevation is more functional than the one overlooking Whitehall Road, although there are still areas of decorative saw-tooth brick detailing under eaves. It has undergone minimal alteration, apart from the replacement of fenestration to the upper storey. There are two outshuts built against this elevation, A4.1 measuring 4m x 1.6m (**Plate 41**) and A4.2 (**Plate 43**) measuring 6m x 2m.

The interior of the building has been substantially altered, with either the removal of earlier features and fittings, or their concealment behind later partitions or suspended ceilings.

The basement extends almost the full length of the building (**Illustration 20**) and comprises a main access corridor (**Plate 81**) along the north, A4 B7, which provides access to a series of rooms to the south, A4B1-A4B8 (**Plates 82-89**). The exterior walls are of stone rubble construction with brick-built room divisions, and the basic layout of the cellars remains as that represented on the 1940s factory plan (**Illustration 13**). The only exception is the room marked as a 'wine cellar', located below the now demolished time office and weigh office (**Illustrations 9,13**).

The ground floor can be subdivided into an entrance (**Plate 47**) and access stairwell (**Plate 45**) to the west, A4G7 and A4G8, with a series of interconnecting office spaces of differing sizes towards the east, A4G1-A4G5 (**Plates 54-58**). Most noticeable is the entrance lobby (A4G7) and staircase, which retains a large amount of decorative timberwork with moulded architraves and skirting. There is a timber stilted round-headed arch to the foot of the main staircase (**Plate 45**). The stair itself appears to have been re-treaded and the accompanying skirting has been replaced, however, the return of the stair has walls covered with decorative polychrome ceramic tile below a timber coving and timber ceiling (**Plates 48 and 49**). Beneath the stair is 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 is covered with modern ceramic floor tiles, manufactured at Burman Tiles Leeds, which have been laid on top of the original tessellated floor of the building (probably dating from the 1891 refurbishment). It comprised large fields of plain white tesserae with a geometric border running around the base of the walls (**plates 51-53**). The remainder of the first floor of the building has been heavily modernised and contains almost nothing in the way of original features. One interesting exception is the partial survival of a large walk-in safe (**Plate 91**) illustrated in Chorley and Cowan's original drawing (Fitzgerald 2004, fig.16c). 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 rear are is small two-storey bay measuring 4m x 1.6m, A4.1G1, added to western end north elevation, bringing it forward to line of remainder of the elevation; tentatively dated to phase 3, c.1916-23. A second

outshut, A4.2, (**Illustration 20**) is a brick-built flat-roofed staircase lobby with staircase, measuring 6m x 2m and built between 1944-1956.

The first floor, as shown on the original architects drawing (Fitzgerald 2004, fig.16c) contains a suite of offices, A4F1-A4F9, with access from a corridor to the north, A4F4 (**Plate 64**). The offices from west to east included, the Corresponding Clerks, A4F1 (**Plates 59-62**), Sir James Kitson' s, 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**). The offices still retain historic details, although they have been extensively modernised. Room A4F1 retains a small wall safe, an original panelled door with moulded architrave and a deep skirting (**Plates 59,60**) and ceiling coving (**Plate 61**). Room A4F5, marked as Sir J. Kitson' s, retains very little in the way of original features other than a pieced ceiling ventilator (**plate 71**). The remainder of the offices on the floor contain nothing relating to the original building, being either removed or obscured.

Running across the width, and beneath the floor, of this corridor is 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. 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, c.1890s.

The second floor (**Illustration 20**) is accessed via a stairway between rooms A4F7 and A4F8 (**Plate 74**). This floor (A4S1-A4S3) was apparently a private dressing room, library and lavatory (Fitzgerald 2004, 12). No historical details survive (**Plates 75-77**) apart from a moulded window frame (**Plate 78**).

Building B1

Building B1 (**Illustration 2**) is a two storey brick built structure (**Plates 3,5**) dating from the first expansion of the works, phase 1, after the site was acquired by James Kitson in 1854. It is located to the west of the entrance gate to the site and forms the end building of a linear range that continues up to the western boundary and railway.

The building measures 7m x 6m, although including the demolished entrance to the east originally measured 17m x 6m. It is built from brick with a pitched slate roof. The south elevation overlooking Whitehall Road has three window

bays. The windows have rubbed brick segmental heads, with continuous stone sills forming upper and lower string-courses. Some of the detailing employed on the building, such as the brick eaves dentilation and the rubbed brick window heads is similar to that used on the eastern range (A1-A4) fronting on to Whitehall Road (**plates 1**).

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

The north elevation has 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. At first floor there is 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 is 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.

The interior of the building has been heavily modernised and little in the way of original features survive. The basement comprises, two rooms, B1B1, B1B2 accessed from the cellar B2B2 from 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, is 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 remains visible, however, the majority is obscured by an inserted suspended ceiling. In the northwest corner of room B1G2 is a stairway, B1G3, which provides external access to the northern yard and up to the first floor (**Plate 99**). It is an original feature of the building, with the south wall clad with painted timber panelling, with a moulded skirting board (**plate 100**).

The first floor rooms of the building are similarly heavily modified, with no original features evident other than the lath-and-plaster ceiling. There is a narrow corridor (B1 F1/B2F1) that connects with the upper floor of Building B2 (**Plate 116**). The floor has been subdivided into modern toilets, B1F2 (**Plate 102**) and a former kitchen, B2F2/B1F1 (**Plate 118**).

Building B2 and B2.1

Building B2 is located between B1 and B3 to the west of the main entrance and fronts onto Whitehall Road (**Illustration 24**). It is two and three storeys in

height, built from brick with a slate roof and measures 14.5m x 6m. It is separated from B1 by a distinct straight vertical joint and was originally two cottages (for early twentieth-century plan see Fitzgerald 2004, fig.14, and for a later depiction c.1941, see **Illustrations 21,22**). Based on the fragmentary remains of the original 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.

The south elevation fronting onto Whitehall Road has two storeys, with a flat-roofed secondary third storey to the west and a gabled three storey to the east. 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 indicates that this range post-dates Building B1 adjacent, although Building B3 to the west is later. There are square brickwork dentils under eaves, apart from the secondary flat-roofed third storey to the west, which has simpler segmental brick heads possibly dating to when B3 was constructed (**Plate 103**). This elevation still retains evidence of the original form of the building. The position of the entrance door can be seen (with the door openings now converted to windows), with that to the west retaining its original boot scraper and the central doorway in the three eastern bays having a void where its boot scraper was located.

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

The interior of the building has been heavily altered, although original features do survive. The basement comprises a large rectangular room, B2B1 (**Plate 124**), with a smaller partitioned store in the southeast corner, B2B2 (**Plate 125**). Access is down a flight of steps in the southeast corner of room B3G1.

The ground floor of the larger, eastern, cottage has been stripped of its original internal room divisions, with inserted beams carrying the upper walls. In their place, the building has 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 are sections of plaster coving at the head of the removed walls (**Plates 107,109,111**). The western cottage is represented by rooms B2G4 and B2G5. Room B2G4 represents the scullery of the cottage, however, the toilet, washbasin, fireplace, and staircase have all been removed. Only the small toilet window and some coving on the east side of the room survives (**Plate 112**). The kitchen of the western cottage is now room B2G5. This room contains no historic elements, other than the original window and the door position in the south wall (**Plate 113**).

The first floor has 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 is a narrow access corridor along the north of the building B2F1 (**Plate 116**), which contains 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 canteen kitchen (**Illustration 21**) which connects directly with B3F1 (**Plate 133**) and is set at a height to correlate with Building B3, thus is c.1m above the floor level in B2.

Building B2.1 is a small, three-storey, brick-built, hipped-slate-roofed annexe, abutting the north side of Building B2 (**Plates 105,127**). The ground plan measures 4m x 3.5m. It has saw-tooth brick dentils below the eaves, indicating a construction date of c.1880-90 and presumably contemporary with Building B3 and the upper floors of A4.

The north elevation has two ground floor doorways with segmental brick heads and one wide modern two 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 has two ground floor doorways with segmental brick heads (blocked), although these are built within earlier window and doorway blockings, again with segmental brick heads (**Plate 105**). At second floor is a rebuilt segmental headed window with a stone sill, similar to the one on the east elevation at this level.

The interior has been extensively altered. It was built to contain a half turn stair with landings around a central core (see **Illustration 23**). The ground

floor, B2.1G1, (**Plates 114,115**) now connects with B2G5, whilst the upper floors B2.1F1 (**Plate 117**) and B2.1S1 (**Plate 123**) are devoid of historic details.

Building B3

Building B3 is the first extension to the western end of the range of buildings fronting onto Whitehall Road (**Illustration 24**) and first appears on the great Northern railway map of 1882 (**Illustration 5**). It is a two storey brick-built structure with a pitched slate roof, sandwiched between B2 and B4 (**Plates 3,4**). The overall appearance of the building offers a more decorative aspect to the southern (public side) elevation, which has seven window bays, with openings alternating on each storey between round-headed and segmental brick heads. The upper round-headed windows break the eaves line and are set in semi-circular dormers. There are stone string courses and an eaves course of saw-tooth brick dentils (**Plate 126**).

The north elevation has 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 window). The windows have segmental brick heads and stone sills, with a saw-tooth brick dentil course below the eaves (**Plate 129**).

The ground floor, B3G1, is a single large workshop space (**Plate 130**), with no features of note. The first floor (**Illustration 25**) has 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**).

Building B4

Building B4 (**plates 3,4**) is the westernmost extension to the Whitehall Road range and first appears on the Ordnance Survey map of 1888 (**Illustration 6**). It is a large two storey brick-built building measuring 29m x 13m, with a slate roof. The south elevation has eight window bays, with openings with segmental brick heads. It has 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 has been carefully in-filled with modern brick and a stone sill to create a window (**Plate 136**).

The north elevation (**Plates 139-140**) has only five bays visible, because the three west bays are abutted by Building B5. The windows have segmental brick heads, with stone sills and there is a saw-tooth brick dentil course below the eaves. On the ground storey there is 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 has had a door inserted post 1956.

Internally this building is a large open floored workshop, B4G1 (**Plate 142**). There is 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 has been inserted and subdivided into two large rooms, B4F1 (**Plate 144**) and B4F2 (**Plate 143, Illustration 24**). An undated plan (**Illustration 23**) entitled 'machine shop on iron side', depicts the building as a double height workshop/hall, with a travelling crane below the first floor windows.

Building B5

Building B5 is a large shed situated at the western end of the site and aligned with the western boundary (**Illustration 2**). 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 building which presently occupies the site of the original smith's shop is a rebuild of 1960s date, for which the plans exist. However, it appears that the footprint of the original building was respected when this later construction took place. The building is of brick pier and panel construction with large metal-framed windows and door openings along the east elevation (**Plates 147,148**).

It is a large double-height workshop building measuring 36m x 15m (**Illustration 30**) with a modern brick construction with tall parapets concealing a pitched roof behind. The east elevation has a brick pier-and-panel construction, with steel-framed windows with protruding concrete surrounds in the Doncasters house-style (see **Illustrations 26-29** for 1967 construction drawings). This comprises 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 are of identical construction, with high-level steel-framed windows and concrete details.

The interior demonstrates nothing of the original function of the building, the modern concrete floor obscures any earlier features which may have remained (**Plates 149, 150**). It is only the roof structure which is of historical interest. This is constructed from a wrought iron trusses and clearly dates to the nineteenth century (**Illustration 31**). These have angled iron principals and diagonals, bar iron ties and forged unions (**Plates 152-161**). The upper face of the principals have short sections of angled iron (of a smaller section) fixed at regularly intervals along their length (**Plate 161**). It is likely that these angles are fixing point for slating laths, indicating the roof covering of the original building.

The roof trusses of Building B5 are of a similar construction to those found in Buildings E1 and G1.1 and are 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 contain conventional rolled-steel stanchions (**Plate 151**), which clearly date to the construction of the present structure in the 1967 (see **Illustration 28**). It is apparent therefore, that the nineteenth-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.

Building Group C – Welfare Facilities

Buildings C1 and C1.1 (**plates 162-172**) are centrally located close to the western boundary to the site, immediately below an inclined access road and to the west of Building I1. The buildings were apparently constructed in close succession to one another, the northern C1, being earlier (**Illustration 32**). Building C1, is a female toilet block, whilst Building C1.1 is a female cloakroom and ambulance block. Neither building appears on the 1953 OS map (**Illustration 16**) however, they are both in existence by 1957 (**Illustration 17**), which correlates with correlates with the partially surviving brass numerals '195-' applied at centre of Building C1.1.

Building C1

Building C1 is a small single storey brick building measuring 9m x 6m. A low parapet (**plate 162**) conceals a flat concrete roof. The east elevation has a

double doorway with protruding concrete surrounds, whilst the north elevations has a row of five high level small steel-framed windows with protruding concrete surrounds. The internal arrangement comprises a lobby (**plate 171**) with a store to the north and a large washroom to the west (**plate 172**).

Building C1.1

Building C1.1 is a single storey brick building of over double the size of C1, measuring 8m x 14.5m, although of similar appearance. The long eastern elevation comprises eight bays containing steel framed windows in concrete surrounds with double doors in bays 2 and 7. These doors have gold painted descriptions on the glazed top-light, 'Surgery' (bay 2) and 'Women' s' (bay 7). The south elevation has three metal-framed windows. The internal arrangement comprises two distinct areas, correlating with the named 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.

Building D1 – The 'Concorde Building'

Positioned between Building E1 and I1 in the southwest part of the site is Building D1 (**plate 179**). It was built to enable Doncasters to develop blades and parts for Rolls Royce Olympus Engines and was known as 'the concorde building' and copies of the original construction plans dated 1972 (**Illustrations 33-35**) indicate that the design appears to have been executed as planned.

It is a large two storey flat roofed building with a cast-concrete frame and a trapezoid footprint, measuring 23m x 38m. The building is divided into seven bays by concrete verticals, between which are continuous metal-framed fenestration, with brick below on the ground storey and profile cladding above and below on the second storey (**plate 175**). The south elevation (**plate 174**) is a continuous wall of brick laid in stretcher bond.

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**) is a workshop floor with a substantial main power system (**plate 178**) required for computer controlled engineering machines. Access between floors (**Illustration 35**) is via precast-concrete stair flights (**plates**

176,182) with subtle panelled decoration at the head of each flight. The first floor (**plate 180**) is partitioned into four main areas, engineers, drawing office, printing and accounts (**Illustration 36**). A suite of 'executive' offices runs along the north wall (**plate 181**).

Buildings E1 and E1.1 – Former A Shop

Building E1 is located to the west of the entrance and east of Building D, and along with I1 appear to form part of a large 'L' shaped complex associated with Kitson's early westward expansion of the Monk Bridge site in the mid-nineteenth century (**Illustration 6**). It is highly likely that these buildings represent the site of the first Steelworks, with building E1 operated as the steel production plant and Building I1 part of the later demolished steel tyre mill.

Much of the historic fabric of Building E1 survives, 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**).

Building E1

Building E1 is 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 building has been extensively altered to enable modern uses of the interior space (**plates 189-191**), however the original layout can 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.

The original open-sided western elevation was infilled during the 1950s/1960s with brick pier-and-panel curtain walling and steel framed windows in the Doncasters house-style (**plates 365-367**). The first bay of primary brickwork at south end has original round-headed bricks forming a large doorway and window with a segmental brick head and stone sill. The remainder of the elevation comprise two phases of post-1950 curtain walling, with the remains of an original two storey brick water tank/engine-house at the northern end.

The south elevation (**plates 184,185**) is of a similar design to those found on the eastern side of the site, having a large central gable flanked by two smaller

gables, marking the positions of two side aisles (**Illustration 41**). The central gable has three large arched openings, which have received inserted windows. The smaller gable to the west has been partially blocked with a brick infilling which is also pierced by a smaller window opening with a segmental head. The east gable retains its open doorway (now housing a modern roller shutter door). A clerestory located in the upper part of the gable, with a blocked oculus vent, demarks the position of a former hot working louver/vent. The original stone copings have been replaced.

The eastern elevation has been partially removed by the erection of Building E1.1, a modern steel framed structure appended to the eastern side of the original structure. The construction of E 1.1 entailed the removal of the external cast-iron columns and the roof trusses in this section of the building. The portion of the original east elevation which does survive (**Illustrations 42-46**) consists of a highly decorative eastern gable of a third engine house (**plate 186**), with 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**), and the east elevation of the north east engine house. The original form of the open sided shed survives between these two structural elements of the building, with the gap spanned by a fabricated lattice wrought iron girder (**plate 207**), which is supported at its mid-point by a slender cast-iron column. A later brick wall has been constructed below the girder, thereby enclosing the formerly open sided shed. It is interesting to note that the fabricated lattice girder is not continuous. There are sections of solid plate girder (**plate 194, 195**) 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 is marked by two brick-built engine houses (**plates 204,205**), one situated at either corner of the structure (**Illustration 39**). The formerly open space between the two houses has been infilled with a later brick wall containing a large door.

The interior of building E1 (**Illustration 39**) represents a well preserved example of a large manufacturing shed dating to the mid-nineteenth century. The interior is divided into three aisles, orientated north-south. The roof

structure of the central aisle is similar to that of Building B5, having angled iron principals and diagonals, bar iron ties and forged unions (**plates 196-201,206**). The trusses are supported on a combination of fabricated lattice (**plate 207**) and plate girders (**plate 194**), in turn supported by cylindrical cast-iron columns (**plates 190,194,195**). The spacing of the columns reflects the use of the differing longitudinal girders. On both sides the three columns are positioned in such a way that the resulting central space is less than those to either side, 6.5m and 13.2m respectively. The lattice girder is used to span the larger gap whilst the plate girder bridges the central gap.

The two engine houses located at the northern end of the building survive almost complete (**plates 204,205**), although their interiors have been radically altered (**plates 202,203**). The interior of the eastern engine house contains a prefabricated office with a modern ceiling. When the office was removed 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 was similarly devoid of any original features (**plates 208-211**). The northern elevations of both engine houses contain the remnants of truncated fabricated girders set on brick buttresses (**plate 299**). These indicate the position of the beams that spanned the 1860s tyre mill prior to its demolition.

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. 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.

Barracough (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.

Building E1.1

Building E1.1 has been built within the south-east aisle of Building E1 (**plates 187,188**). 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.

Building F1

Positioned immediately to the west of the main entrance (**Illustration 2**) are Buildings F1, F1.2 and F1.3. Building F1 (**plate 213**) is a two storey structure built between 1921 and 1932 (see **Illustrations 11,12**). It has been interpreted as an early laboratory (Kinchin-Smith 2005), although no positive evidence for this has been identified. On a plan dated 1944 (**Illustration 14**) it is labelled as an ambulance room, with a garage located to the rear. A later plan dated 1956 (**Illustration 48**) submitted by Doncasters for planning permission to extend the rear of the building again refers to this building as housing an ambulance room, wash rooms and office. It is possible that soon after the extension the ground floor rooms were converted to a laboratory, with ambulance facilities transferring to Buildings C1, C1.1 (**plate 163**), again dated to the 1950s. The lettering 'Laboratory' above the entrance doorway into Building F1 (**plate**

212), is identical in design to that above the glazed top-lights on Building C1.2., indicating a contemporary period of application.

The building is constructed from brick with a hipped slate roof to southern half and flat roof to the north with corbelled brick gutter brackets. The maximum dimensions of the footprint are c.9m x 9m, although it is not square having angled corners to the south elevation (**plate 212**). The south elevation has two bays, each containing windows with another window bay in the south-east angled corner and a double doorway in the south-west corner. Many of the windows have angled brick sills and sandstone lintels with a simple incised moulding forming the window head. The east and west elevations are of four bays, although there is a structural joint at the mid-point (**plate 214**), indicating that the upper storey was originally of only two bays (**see Illustration 48**). There is a converted doorway in the end bay of the east elevation (**plate 214**) and a small window between the 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 48**). The west elevation is largely concealed by a pentice attached to Building E1.1, although blocked windows were noted at ground level (**plate 212**).

The interior of the building (**Illustration 50**) is of some interest due to the survival of the laboratory benches and equipment. The internal space F1 G3 is divided by a half-glazed partition, creating office and working areas complete with hardwood benches and laboratory sinks (**plates 217,218,222**). A further ground floor room F1G2 (**plate 223**) functioned as a chemical store and contains a large fume cupboard. The upper floor rooms functioned as office space in the final phase and other than the surviving original window, contains nothing in the way of original features (**plates 224-226**). It is worth noting that one of the former upper floor windows in the southwest corner has been removed and converted into a taking-in door (**plate 212**).

Building F1.2

Building F1.2 (**plates 215,216**) is a two storey toilet and locker room block dated to 1956 (see date on **plate 216**). Built to the north of Buildings F1 and F1.3 is a rectangular building measuring 9m x 13m. It is a brick built and conforms to the Doncasters house style with a flat roof concealed behind a low parapet, and forms part of the re-organisation and upgrading of facilities during the 1950s-1960s. Another example of this is an extract from a planning

application of this period to provide new welfare facilities elsewhere on the site (**Illustration 49**), although its exact location is unknown. The east elevation has seven bays, five of which are fenestrated with metal-framed window, with blind bays at either end. There is an inserted door and window in the south end of the east elevation. The north elevation (**plate 216**) is divided into four bays with a pair of central single doors at ground floor and flanked by windows. The first floor has four windows, one in each bay, although the concrete surround of the two central ones forms a continuous detail.

The interior of the building remains little altered since its construction. It is used for staff welfare facilities, with showers and toilets on the ground floor (**plates 219,220,221**) and a large proportion of the first floor taken up by employee' s lockers (**plates 227-230**). The lockers themselves are of some interest as there 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.

Building F1.3

Positioned between Buildings F1 and F1.2 (**Illustration 2**) is a small 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). It only measures 9m x 3m, with one window bay per storey (**plate 215**). Internally, the small rooms (**plates 225,226**) are fitted out and decorated as offices.

Buildings G1, G1.1

Buildings G1 and G1.1 are 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 exterior fabric (**plates 233-239**) dates predominantly from the 1950s-60s phase of redevelopment of Doncasters; however, internally they retain structural elements relating to the original Witham' s Forge.

Building G1

Building G1 is a large single-storey rectangular shed with a portal frame roof (**plate 243**), measuring c.15m x 25m. The south elevation (**Plates 233,234**) has a large central three bay brick gable, flanked by a single flat-topped single bays. The central gable has a tall central round-headed blind arch with a projecting double doorway and a blocked window over, flanked by blind

openings to either side. This gable is of interest in that it is not constructed in the prevalent Doncasters house style, rather the arrangement of a central gable flanked by single bays to either side mirrors the earlier, nineteenth-century, structures on the site. It is suggested that the brickwork may in fact 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 the east elevation (**plates 235-239**) is more in keeping with the contemporary architectural arrangement of the site, being of brick pier-and-panel construction and possessing pairs of metal framed windows on either side of three large roller shutter access doors (**plate 236**). The west elevation, a former external wall now encased by Building G1.3, is of a similar construction, being brick pier-and-panel bays, each with two steel-framed windows, apart from bays 1 and 9 where the windows are blocked with modern brick.

The footprint of Building G1 roughly corresponds to the straightening shed attached to the eastern side of Witham's rolling mill of 1851. The original design of the shed can be seen on deposited building plan 'No 37 of 28.11 (1879)' submitted for alterations to the roof of the building, but also detailing the south elevation. This shows a wrought iron truss supported on a fabricated girder resting on a stone pad, to the west (being the south-east corner of the rolling mill) and to the east supported by a cast-iron column, that which now survives encased within the gable wall (**plate 244**). Encased within the internal fabric of the south gable is one of these original cylindrical cast-iron columns and projecting from it internally are the remains of a fabricated girder dating from the earliest phase of the construction (**Illustration 52**).

The remnants of fabricated girders which project from the interior south wall of the structure indicate that this was an open sided building, communicating with the rolling mill on the west and No 1 puddling shed to the east and later extended to join the north wall of the Whitehall Road range (see **Illustrations 6-10**), in the c1890s to provide a covered area over one of the internal factory railway lines presumably functioning as a loading bay (**Illustrations 7,8**). Each girder would have been supported by a further cast-iron column, one on either side of the building (see **Illustration 51**), creating a span of c.45 feet

(13.8 m). However, these have now been removed. The only columns to survive are three contained within structure G1.1.

Building G1.1

Building G1.1 is located at the northern end of Building G1 (**Illustration 2**) and measures c.8m x 10m in size. It formed the junction between the 1851 puddling shed and the rolling mill. The structure contains three cast-iron columns forming three corners of a square with sides of 30½ feet (9.4m), the support for the fourth southwest corner was provided by the now demolished No 1 engine house (**Illustration 52**). The two eastern columns support a fabricated lattice girder (**plate 245**), which originally spanned the width of the No 2 puddling shed. The columns also support two surviving wrought iron roof trusses (**plates 246,247**) that have similarities in design to those in Building B5 and E1. These have angled iron principals and bar iron ties all with forged knuckles (**plates 249,252,253**). 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**).

Building G1.2

Attached to the northwest corner of Building G1.3 is G1.2 (**Illustration 2**), constructed c.1956. This structure has a single roof bay measuring 13m x 8m (**plates 231,274**). It is supported on steel stanchions and fabricated bolted steel trusses.

Building G1.3

Building G1.3 is a large and modern rectangular structure (**plate 231,232**), located to the east of the entrance into the site and built against the west wall of Building G1. It has a steel frame construction that is clad in profile metal sheeting. It measures 8m x 24.5m and was built over a former external yard (see **Illustration 18**) It contains a series of internal tanks (**plate 240**) and extractors (**plate 241**), some of which were located on the roof and together operated as an effluent plant.

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

Centrally positioned along the eastern edge of the site (**Illustration 2**) is a large modern workshop, which can be subdivided into three phases of

construction, Buildings H1, H1.1 and H1.2 (**plates 254-265**). The rectangular footprint measures 23m x 33m and can be sub-divided into nine bays. Internally, a steel frame supports a glazed north-light roof, which is concealed by a brick pier and panel walling built in the 1950s-60s house-style utilised by Doncasters throughout the site. Large metal framed windows provide natural light (**plate 255**), with the north and south elevations comprising continuous metal framed glazing, with profile cladding above (**plate 260**). The profile of the roof is concealed by a brick parapet, apparently dating from the final phase of expansion.

The earliest part is the northern section. This was built after 1953 (see **Illustrations 16,17**) and the external brass numerical date of 1957 (**plate 256**), documents when it was completed. Up to the 1930s (**Illustration 12**) the site was partially covered by a pair of rectilinear puddling sheds dating from the early period of the forge c.1860s. No traces of these structures were extant at the time of survey. The second phase of expansion, Building H1.1, was towards the south in 1964, with a final expansion, Building 1.2 in 1965. Drawings for the 1965 extension (**Illustration 54-56**) depict the exposed profile of the roof, a detail which was actually concealed during construction, or soon afterwards (**plate 255**).

Sandwiched between the east wall of Buildings H1, H1.1 and H1.2 and the canal boundary wall is a low range of extensions measuring 4m x 31m, Buildings H2 and H2.1. They are plastered throughout, and no original features, windows or openings are extant, although from the riverbank (**plate 254**) a blocked semi-circular arch 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, a lack of access to the canal path and a thick external coat of render prevented further examination of this feature.

Buildings I1 and I1.1

Building I1 located in the western part of the site, (**Illustration 63**) has undergone significant alterations since it was constructed in the c1860s. In its initial form, building I was part of a much larger open sided forge building, connected to the northern end of Building E1, as depicted on the 1866 map of the site (**Illustration 4**).

What now survives from the 1860s building is the western gable with one bay returns to both the north and south and two cylindrical cast-iron columns (**plates 273-275**). The western gable continues in the general style of the other earlier buildings on the site (Buildings E1, G1), having three tall arched opening (now blocked to half height). The rubbed-brick arches are unusual in having cast-iron keystones. Unusually, the sandstone foundation course of this gable is extant, presumably due to reduction in original ground levels (**plate 273**). The upper section of the gable, above the level of the central opening, has 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), illustrates 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 contain remnants of original features (**plates 274-275**). To the north is a large opening, partially infilled with later 1950s brickwork and to the south is 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 are present on both elevations. These are 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.

The interior of the building contains two cast-iron columns (**plates 287, 290**) which relate to the 1860s open sided forge and demark 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**) has been truncated and the original longitudinal fabricated girders, which would have formerly supported the roof of the open sided shed have 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 to against the north of Building I1, is I1.1 (**plate 274**). This is a pent-roofed extension constructed with brick walling and large metal-framed windows typical of the 1950s-60s period of expansion and rebuilding.

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

Built against the east of Building I1 is a large shed constructed possibly at the time of the First World War (**Illustration 63**), Building I2.2 (**plate 294**). This structure is triple-height, with a steel-frame measuring 33m x 8.5m. It has modern profiled cladding and no evidence was noted for a ventilation clerestory. Massive stanchions (**plate 298**), carrying modern rolled steel overhead-crane runners and deep, light-weight longitudinal lattice trusses carry the roof trusses. These are bolted together from rolled steel sections, both having gusset plates at junctions (**plate 297**).

Building I2 is of a similar design to Building I4, however is lighter in its structural elements, but has the appearance of a building from the first half of the 20th Century. The original roof covering has been replaced with modern metal profile cladding. If the shed was originally open sided then these have been closed by the construction of further buildings to the north (I2.3) and south (I2.1). It is entirely possible that this building formed part of a larger structure, the building of which entailed the demolition of the eastern section of the earlier tyre mill building I1 and the northern end of building E1. The dating of building I2.2 is made a little more problematic when the 1921 (Fitzgerald 2004, fig.34) aerial photograph of the site is examined, owing to the fact that at this date it appears that both of the earlier buildings remained intact. Therefore it would appear that building I2.2 is not of such an early date as first envisaged.

Buildings I2.1, I2.3 and I2.4 are of limited historical, or technical interest, and date to the 1950s refurbishment of the site (**plate 295**). 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. Building I2.1 is a modern double height steel-framed pent-roofed range, measuring 33m x 7m, with Buildings I2.3 and I2.4 both measuring 33m x 4m.

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

Constructed between Buildings I2.1-2.3 and I4.1-4.2, is a triple-height, three aisled, steel-framed range (**plate 311**) which was built in multiple phases (**Illustration 19**). The southern aisle built against Building I4 (**plate 305**), comprises Building I3 which measures 9m x 15m. It is clad with corrugated

asbestos, and has a slate roof and clerestory ventilation. Structural support is provided by massive stanchions, which support overhead-crane runners and rolled steel joists carrying later roof trusses (**plates 303-304**). The roof trusses are bolted together from rolled steel sections, with gusset plates at junctions (**plates 301-302**).

The central and largest structure of this group is Building I3.1 (**plate 311**). It is a triple-height, steel-framed range, measuring 15m x 13m. Massive stanchions bolted together from rolled steel sections, carry rolled steel overhead-crane runners and rolled steel joists carrying roof trusses dated to the 1950s-60s. These are constructed from bolted rolled steel sections, with gusset plates at junctions. It is worth noting that the south stanchions and truncated plate girders (**plate 306**) date to c1916-18, whilst those to the north are c1933-1944.

Built to the west of Building I3.1, is Building I3.2 (**plate 311**). This is a modern double-height, steel-framed pent-roofed range, that measures 12 x 7m. Built-up stanchions to north date to c1933-1944, whilst the rolled steel principal rafters and other roof members date to the late 1950s.

The northern range is a Triple-height, steel-framed range of the late 1930s-40s, Building I3.3 (**plate 299**). It measures 27m x 8m and has massive stanchions bolted together from rolled steel sections, carrying rolled steel overhead-crane runners and rolled steel joists similar to Building I3. The roof trusses are bolted sections, with gusset plates at junctions.

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

A massive triple height steel framed structure with three aisles that dominates the centre of the site, comprises Buildings I4, I4.1 and I4.2. The building was erected in c1911 as a new tyre mill allowing the expansion of the steel works during the build-up to the First World War (**Illustration 58**). Its footprint measures 39m x 9m (I4, **plate 300**), 50m x 13m (I4.1, **plates 298, 312**) and 50m x 8.5m (I4.2, **plate 299**). Massive stanchions bolted together from rolled steel sections, carrying built-up overhead-crane runners and longitudinal lattice trusses carry the roof trusses. The longitudinal- and roof trusses (**plate 307**) are also bolted together from rolled steel sections, with gusset plates at junctions. The roof is covered with blue slate and there are 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 is marked by the survival of two cast-iron columns (**plate 251-253**). They have bolting holes located on their northern faces indicating that the longitudinal girders of the original building extended in this direction prior to the construction of the later shed. An aerial photograph of the site, dated to 1921 (Fitzgerald 2004, fig 34), illustrates 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 is a series of small brick adjoining structures (**plates 308-310**), including an electrical switch-room, with offices above. They are dated 1960 (**plate 282**) and conform to the style of contemporary buildings on the site such as H1 - H1.2.

Building I4.3 is a long, single-height, pent-roofed lean-to extension along the northern edge of Buildings I3.2 and I4.2, c1950-60s in date. It measures 80m x 4m (**plates 276-278**). The structure comprises stanchions and principal rafters of large, continuous rolled steel joists (see **Illustration 59** for construction details). Curtain walling consists of brick, with steel-framed windows with brick sills and a continuous band of fenestration below the eaves, roofed with profiled metal cladding.

Building I5 – press shop

Building I5 is an extension built against the eastern gable of Building I4 in c1973 (**Illustration 63**). It is an extremely large triple-height, steel-framed shed measuring 16m x 26.5m (**plates 279, 325**). Stanchions and roof trusses are welded together from rolled steel sections, carrying rolled steel overhead-crane runners which are clad externally with profiled metal sheeting (**plates 284-285**). It is by far the tallest building on the site, constructed to house a massive 14,000 ton press (see **illustrations 61-62**). The press had been removed at the time of survey, however the massive pit, within which the press formerly stood, was intact (**plates 313 and 314**)

Buildings I6 and I6.1

Located in the north-west part of the site to the south of the viaduct and Buildings I1 and I2 is an elongated ranged of large modern workshops, Building I6 (**Illustration 63**). This building is c1970 in date and measures 58m x

19.5m, with the northern wall tapering towards the east to accommodate the angled orientation of the viaduct. It has a steel-framed (**plates 321-324**), with curtain walling of aluminium-framed windows, profiled metal cladding above brick footings (**plates 276, 317-320**). The roof has a shallow pitch (see **Illustration 60** for roof detail).

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

Built adjacent to the north-east boundary wall overlooking the canal is a small single storey range (**plate 322**). The rectangular footprint measures 5m x 22m and is subdivided into two phases of construction, Building J1 being to the north, with Building J1.1 built against the south wall of J1.

Constructed in brick its external appearance conforms with the utilitarian house style adopted by Doncasters during the 1950s-60s. There is a flat concrete roof with a low brick parapet and an access ladder from the south (**plate 322**). The external west and southern brick walls were rebuilt in the 1950s-60s, whilst the internal north, east and central dividing wall between the two buildings date to the nineteenth century (initially depicted on the 1882 map, **Illustration 5**).

Building J1 (the compressor house) has three double doorways in the west elevation, two contain roller shutters and the other glazed doors. Internally, there are three blocked round headed windows in the east wall (**plates 328,329**) which appear to date to pre 1882. The blockings occurred during the 1950s-60s reorganisation of the buildings, when J1.1 was constructed and the west wall rebuilt.

Built within Building J1 is a metal frame (**plates 328,329**) comprising rolled steel girders, that project through the ceiling and support a pair of large cylindrical riveted tanks on the roof (**plate 323**). These tanks are located at the north end of the roof and supported upon two substantial riveted box girders (**plate 324**). There are a pair of undated drawings depicting the tanks and girders (**Illustrations 64,65**) and it is likely that they were added, reusing the box girders, during the 1950s-60s rebuild of the west wall and addition of Building J1.1. Their function would have been to provide reservoirs for compressed air for powering machinery in adjacent factory buildings.

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

The northern boundary to the site (**Illustration 2**) is formed by the brick arches of the River Aire viaduct (**plates 331,335,337,339**), the fabric of which was beyond the scope of this survey. The space beneath each arch has been utilised for either storage areas, or building plots for small free standing structures of varying dates and sizes.

The arches are numbered from west to east (**Illustration 67**) as follows (the appropriate photographic plates and build dates of those that contain buildings, or structures are listed): K1: void (**plates 338,342-343**); K1.2: void (**plate 344**); K1.3: c.1950s-60s (**plates 345-347**); K1.4: late 1950s-60s (**plates 348-349**); K1.5: Modern tanks (**plates 350**); K1.6: 1950s-60s (**plates 351-352**); K1.7: 1950s-60s (**plates 353**); K1.8: 1850s-1880s with 1950s-60 frontage (**plates 333,340-341,362-363**); K1.9: late c.1914-23 with 1950s-60 frontage (**plates 333,354-355**); K1.10: 1950s-60s (**plates 333,356**); K1.11: void (**plates 357**); K1.12: void (**plates 336,358**); K1.13: c.1970-75 (**plates 332,336,360**); K1.14: 1960s (**plates 336,359**); K.1.15: c.1914-23 (**plates 330,334,361**).

Only three of the arches contain buildings of any historic interest, which are K1.8, K1.9 and K1.15 and are discussed in turn below. The other structures are simple, flat-roofed brick structures, or wider span sheds with fabricated steel frames and steel-trussed roofs, all of which date to the 1950s-1960s.

Within arch K1.8, (**plates 340-341,362-363**) is a timber shed that dates to the earliest phase of forge. It is constructed with massive timber uprights supporting a substantial wall plate. The northwest and west walls are clad with 3cm thick horizontal timber boards. The roof structure (**plate 341**) is a king-post truss with trenched purlins and roofed with timber boards. Many of the timbers contain redundant mortises and ambiguous carpentry marks, indicative of their re-use from another structure. The shed also houses an early travelling crane. The RSJ uprights which support the weight of the crane are set in cast shoes at the base (**plate 340**). This building is depicted as an open fronted shed on the 1923 site plan a later frontage was added, presumably sometime during the 1950s.

A steel-framed shed with steel-trussed roof and a travelling crane is positioned within arch K1.9 (**plates 354-355**). Both the shed and the travelling crane (**plate 355**) are shown on the 1923 Factory Plan, although they are open fronted at this date, presumably being enclosed during the 1950s-60s.

The final historic structure is beneath arch K1.15 (**plates 334, 361**). It consisting of a steel-framed shed with a steel-trussed roof and is depicted on the 1923 Factory Plan. Again, similar to the building under arch K1.9, it was open fronted, presumably being blocked during the 1950s-60s following the early redevelopment phases of the site by Doncasters.

5 PHASED DEVELOPMENT OF BUILDINGS

The following section is a simplified outline of the phased development of Monk Bridge Forge. Due to the amount of alterations to the layout, minor and major structural alterations the site has been subdivided into six phases, each spanning twenty-five years from 1851 to 2006 (see **Illustration 19**).

5.1 Phase One (1851 to 1875)

The earliest structures that remain on the site are those which are associated with the works established by Stephen Witham in 1851. Witham's *Monk Bridge Iron Works* was a purpose built forge, which supplied high quality iron. The original extent of the early works was restricted to the eastern half of the present day site (**Illustration 2**), which at that time was traversed by a road known as the Holbeck pasture extension. This formed the western boundary of the 1851 works. An oil painting dated to 1853 depicts the works as viewed from the east bank of the River Aire (Fitzgerald 2004, fig.3). There may however, be inconsistencies between the buildings represented in the painting and those shown on the two earliest maps, both dated to 1858 (**Illustration 3**). The painting conforms to the appearance of a nineteenth-century ironworks. Two large well ventilated sheds with chimneys rising from the several furnaces contained within, and beyond, a third building, probably a rolling mill running at a right angle to Whitehall Road. There is also a single storey range of buildings fronting onto 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 Witham'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 also acquired and the works expanded accordingly. The Brierly map of 1866 (**Illustration 4**) show the achieved extent of the site at this date and a description of the site, *Fortunes Made in Business (1887)*, details the processes carried out on the site at this time. Some of the buildings associated with this expansion are represented with the present site.

Elements of the Whitehall Road range are representative of the westward expansion, including two cottages (building B2) situated to the west of the main entrance. A large L-shaped shed situated slightly to the north possibly relates to crucible steel shop and steel tyre mill. Certain important elements of this shed remain incorporated with later additions to the building (Building E1). Two further buildings remain from this phase of the works; a rectangular building (building B5) at the extreme western end of the site, running parallel to the Midland Railway, referred to as a 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)

The second phase of development at Monk Bridge came after the conversion of the Monk Bridge Iron and Steel Company into a limited company in 1886 (**Illustration 6**). As much of the manufacturing facilities of the site were well established by this date, the focus of attention for building activities was the office range of buildings fronting onto Whitehall Road.

5.3 Phase Three (1901 to 1925)

The third phase of development involved substantial amounts of construction taking place. The erection of a new tyre rolling plant, buildings I4, I4.1 and I4.2, being the major addition to the site in 1911 (**Illustration 11**), 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, as suggested whilst the works were under Government control during the period of the First World War. Further smaller scale building programmes took place during the period including the addition of a second storey, 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 this building is unknown, 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. These are both steel framed sheds with steel trussed roofs.

Buildings I4, I4.1 and I4.2, constitute three parts of a massive construction with extremely large fabricated stanchions supporting longitudinal girder and bolted steel trusses.

5.4 Phase Four (1926 to 1950)

The period 1926 to 1950 (**Illustrations 12-14**) saw little in the way of major structural development taking place on the Monk Bridge site (that is the portion of the site located to the north of Whitehall road). For a proportion of this time Monk Bridge was under the control of the government. Only two buildings appear to date from this period, I3 and I3.3. Both of these structures are large steel framed sheds apparently constructed to link the earlier Phase Three buildings

No additional information was gained during the survey of these structures.

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. The manufacture of forged turbine blades for jet engines became the primary product of the works. The take-over of the site by Doncasters

coincided with renewed investment in the infrastructure, resulting in a programme of structural refurbishment and new build on the site (**Illustrations 15-18**). 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 sixth phase of development at Monk Bridge 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 14000 ton press and building D1 (The Concord Building) notable for the connection with the manufacture of turbine blades for Rolls Royce Olympus engines.

6 CONCLUSION

Monk Bridge Forge developed by the Kitsons during the 1850s-70s was one of a small number of firms that provided high quality forgings that enabled Leeds to become a key player in the development of the locomotive industry during the latter part of the nineteenth century. The size, complexity and scale of the buildings that remain on the site at the time of survey are all confirmation of its prominence within the region, and by the 1900s it was renowned as a market leader.

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 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. Even the late nineteenth-century offices are more than purely functional, with a decorative external façade overlooking Whitehall Road and impressive internal public spaces, such as the lobby with mosaic flooring and glazed walling tiles locally manufactured at the Burmantoft factory.

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 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' constructing their own purpose built laboratory. It has been extensively altered during the preceding years, however is a testament to the importance placed on the development of new materials and emerging technologies, continuing the long history of innovative engineering in the Holbeck area of Leeds.

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10 ILLUSTRATIONS

APPENDIX 1: WYAAS PROJECT 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

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

¹ *Pers. Com.* Ron Fitzgerald

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 arte 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 c1916-23, 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 c1850s-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 c.1916-23): 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 wysmr@wyjs.org.uk). 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, ~~lest~~ supporting 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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