Saw Shed, Lee Quarry, Bacup

An Archaeological Recording and Monitoring Programme

By J.M. Trippier Archaeological and Surveying Consultancy

Part 2: Results

October 2011

Clients: Pennine Lancashire Groundwork

CONTENTS

EXECUTIVE SUMMARY
Stone was being quarried from Lee Delph from the early 1800s at least but the mid to late-19th century was characterised by a significant expansion in quarrying brought about by increased urban growth, mechanisation and improved stone-working techniques. The Sawshed at Lee Quarry, which is the subject of this report, was built between 1910 and 1930 and probably went out of use in the 1950s. Latterly it was in a ruinous condition and required urgent conservation work to prevent further deterioration. Groundwork Pennine Lancashire commissioned such work and instructed J.M. Trippier Archaeological and Surveying Consultancy of Bolton to carry out an archaeological recording programme and archaeological monitoring of the conservation work. A report of March 2010 fulfilled the first requirement and this report fulfils the second by recording the results of the excavation and conservation work which were numbered Item 7 in the previous report. This sequential numbering has been followed in this report.

Items 1 to 6 –see report of March 2010

7. RESULTS

EXCAVATION AND CONSOLIDATION

7.1 Excavation and consolidation of the Saw Shed were carried out during the Spring and Summer of 2010. Prior to excavation the detail of the monument was largely obscured with fallen stone debris and associated material from the collapsed building although the two bays into which it was divided were clearly discernible (**Plate 1**). The excavation mainly comprised the removal of fallen stone debris from the collapsed building and associated material. This work was carried out by Paul Moore and John Bradford using mechanical diggers and dumper-trucks. However it was also necessary for them to carry out a considerable amount of this clearance by hand, particularly at the east end of the building where it was not possible for the machines to gain sufficient access (**Plate 2)**.

7.2 The south bay of the building contained a considerable wet area which had led to the growth of a substantial clump of rushes which overlay much of the demolition layer and had to be cleared before the latter could be removed. So it was decided to clear the north bay of the monument first as the flagged floor level was at least partially visible and gave a clear working surface.

7.3 Two areas of particular concern were north and east walls of the building, both of which required further attention before clearance, could begin. It appeared that a considerable mound of material had been deposited against the outside of the former and was now causing it the buckle inwards (**Plate 3**). One of the first tasks therefore was to reduce this mound and relieve the pressure on the wall itself (**Plate 4**).

Associated with this was the excavation of a trench along the exterior of the north wall which was subsequently used to drain the rear of the site (**Plates 5 to 7**). A similar drainage trench was later excavated along the south side of the building (**Plate 8**). In order to excavate the northern drainage channel it was necessary to remove a manhole cover that had been produced from the quarried rock but left on the site (**Plate 9**). Below this was a dump from which was retrieved a large number of finds associated with the Sawshed and quarry workings (**Plate 10**).

7.4 The other area of concern was the east wall of the Sawshed which had been built hard against the adjoining hillside. Fallen stone and vegetation were now overlying the ruined wall to such an extent that access for suitable conservation work was not possible (**Plates 11 & 12**). So again, this part of the hillside had to be removed and terraced both to relieve the pressure on the wall and to enable the conservation masons to proceed with their work. Because of the difficulties in getting machines into this restricted space this area had to be largely excavated by hand (**Plate 13**). The hillside itself was stabilised by the laying of large stone blocks behind the newly excavated wall (**Plate 14)**.

7.6 Following clearance of the north bay by machine (**Plate 15**) it was possible for the conservation work to start. The conservation work was carried out by Anthony Walmesley and Duncan Goodenough. This work involved the resetting of existing in situ stone complemented with additional stone selected from the removed demolition material where needed to achieve satisfactory end product (**Plate 16**). It was occasionally necessary for the masons to slightly reduce wall levels in some places to produce a firm working plane but generally the existing and varied profile of the ruinous walls was maintained rather than engaging in any attempts at reconstruction. The reset stonework was mortared and pointed with a mix which was intended to replicate the original as closely as possible. Initially sand from Leighton Buzzard was used as on other projects (**see Appendix 5 of original report)** but this resulted in too yellow a mix (**Plate 17**) and a locally produced sand was used which produced much better results (**Plate 18 & Appendix 4 of this report**). The tops of the walls were filled with gravel (**Plate 19**) and then topped off with a convex concrete haunching laid on a layer of Terram (**Plate 20**). Concrete was chosen because it was readily distinguishable from the original wall formations but also so that the copings can be removed at any point in the future, returning the wall to its original form.

7.7 As conservation continued in the north bay excavation of the south bay began, again using mechanical diggers (**Plate 21**). One of the first artefacts to be discovered was a crane jib lying amongst the rushes in the south bay (**Plate 22**). This was recovered and photographed (**Plate 23**). It no doubt once belonged to one of the massive stone crane supports situated to the west and south of the saw shed. Another feature to be

discovered early on in the clearing of the south bay was sets of rail lines which entered the shed from the west (**Plate 24**).

7.8 As excavation continued the floor surface of the south bay was uncovered. This proved to be the natural rock upon which had been laid longitudinal concrete pads or bases which ran almost the full length of the shed (**Plates 25 & 26**). At the rear (east)end of the shed was a line of large raised concrete blocks with sloping fronts which contained shallow grooves (**Plate 27**). Between the pads and the blocks a shallow channel was discovered which appeared to have acted as an open drain removing any standing water (of which there must have been prodigious amounts) via an outlet in the south wall. This drain has now been utilised for the same purpose (**Plate 28**). The blocking of this appears to have been the main reason for the boggy rush covered interior of the south bay.

ANALYSIS AND INTERPRETATION

7.9 The completed excavation of the saw shed revealed an impressive structure with many interesting features (**Plates 27 & 28 and Figs. 1-2**). It was already clear that the shed comprised two bays with entrances at the west end –one to the north bay and two to the south. The walls had been severely reduced since the building fell into disuse but the lower parts of three windows were apparent in the north wall. These had splayed jambs (**Plate 29**). The excavations revealed fragments of wire-glass c.7mm thick from amongst the demolition debris east and south-east corners of the north bay (**Plate 30**). This seems to illustrate that the structure must have been subject to significant vibration from the machinery within. Some of the glazing pins that held the glass in place were also found in situ (**Plate 31**). It was also apparent that, where appropriate, the walls were based upon the natural (Rossendale Flag) rock. This was especially visible in the north-east and south-east corners of the north bay (**Plates 32 & 33**). (NB the two sets of wheels shown in Plate 33 were actually recovered from the excavated drainage channel outside the north wall and relocated for display purposes into the north bay). It seems likely that these formed the bogey for a cart of some sort used for moving items around the quarry.

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7.10 In the east wall an opening was revealed which appears to have held the remnant of some pipework but whether this was an inlet or an outlet was not clear (the former seems more likely). The centre of the bay contained a number of large concrete machine bases with fixing pins still in place. These have lead to the conclusion that the north bay housed the engines that were used to drive the saws situated in the south bay. The lack of any boiler house and chimney at the site have also led to the conclusion that the machinery must have been driven by electricity either from the mains supply or generated on site. The comparatively late date for the sawshed –between 1909 &1930 (see para. 3.10 of original report) –

seems to support this conclusion. The base of an H-section stanchion, which presumably supported the roof of the saw shed, lies against the north side of one of these (**Plates 33 & 34**). A row of similar stanchion bases continues across the east end of the south bay (**Plate 35)**. Initially these were encased in concrete (**Plate 36**) but this has now been removed. One of the roof trusses, which these stanchions would have supported, can be seen poking above the roofless sawshed on the front cover of the original report. A doorway between the north and south bays has also been reset. A pile of 'shot' was discovered in the south bay against the dividing wall just west of the reset doorway (**Plate 37**). This comprised steel particles that would have been used to increase the efficiency of the saw blades when cutting through the stone blocks from the quarry.

7.11 The south bay had two windows high in the east wall and a least one in the south wall (most of the south wall had been reduced to such a level that the evidence for any other windows no longer existed). Unlike the north bay which only had a single entrance in the west wall, the south bay had two quite close together. The picture on the front of the original report also demonstrated that there had been a window between them although, again, most of the wall had been reduced to such a level that there was no longer any physical evidence of this. The discovery of a set of rail tracks entering the bay through each of the doorways (**Plates 38& 39**) clearly demonstrated that this was how the blocks of stone from the quarry were brought into the shed in order to be sawn up into flags. It also seemed apparent that the saw frames themselves must have sat over the rail lines with their four feet resting on the concrete pads on either side of the tracks (**Plate 40 & 41**). The base of one of the supporting stanchions was still in place as were the pins that would have held the other feet in place (**Plates 41& 42**). **Fig 3** shows the type of saw frame that was likely to have been used. One of the saw blades that was recovered from the debris within the south bay is now displayed on the east wall (**Plate 43**). The other major feature of interest is the large concrete blocks situated against the east wall of the south bay. These have sloping fronts which contain deep grooves (**Plates 43& 44**). The tops also contain numerous fixing pins and plates indicating that these blocks must have held other machinery (**Plate 45**). If the arrangement was similar to that depicted at Fig.3 it seems likely that the grooves in the blocks must have held the flywheels to drive the saws or enabled the retraction of the saw blades during sawing process. Finally a number of artefacts discovered during the excavation have been put on display in the sawshed. Those in the north bay (**Plate 46**) are miscellaneous items whilst those in the south bay (**Plate 47**) appear to be parts from the saw frame. Both of the sets are described in more detail at Appendix 3

7.12 The rail lines which brought the stone into the shed extend for only a short distance outside the doorways of the sawbay and the cartographic evidence is of no assistance in assessing their starting point. The Sawshed stands at the extreme south-east corner of the quarry which was

not opened up until after 1909(OS) and by 1930 (OS) the building was described as a stone crusher as was the much degraded building across the valley to the north-west. At that date a number of railway lines, which approached from the north-east, terminated in the vicinity of both crusher buildings which appeared to be something of a focal point amongst the quarry workings at that time. However none of these lines appear to relate to those now found to be entering the shed. Also there was an extremely large travelling crane gantry orientated at right angles to the front of the shed. However these substantial features must have been removed subsequently and it is clear from the layout of the shed and the artefactual remains found within it that it was latterly used as a sawshed.

7.13 It is possible that the substantial jib bases located outside the shed (**Plate 48**) may have been used to load the trucks up in close proximity to the shed doors and part of such a jib was found amongst the debris within the shed itself as well as another in the depression (now filled in) just to the south-east. Despite their roughly constructed appearance, suggestive of earlier quarry workings, they appear to be situated either on the site of the travelling crane or in the late developed area south-east of the sawshed indicating that they are of a relatively late date. It can therefore be postulated that the building was originally constructed as a crusher but was converted to a sawshed post-1930.The trolley depicted on the drawing a Fig. 3 is relatively small and it may be that it was moved into place under the saw frame by force of gravity but this is still an issue that is open for discussion.

CONCLUSION AND RECOMMENDATIONS

7.14 *The Valley of Stone* project, of which the excavation and consolidation of Lee Quarry Sawshed was part, was carried out by a multiple partnership of interested parties led by Rossendale Groundwork (as it then was) and sponsored by the Heritage Lottery Fund with the aim of *inter alia*, of producing a regionally significant heritage resource focussing on the historic stone quarrying activity of Rossendale. Work on the sawshed was an integral part of the project.

7.15 A number of previous studies have been carried out on various aspects of the quarrying industry in various parts of the UK. Some of these were helpfully brought together in Stainier's *Stone Quarry Landscapes; The Industrial Archaeology of Quarrying* (2000) but this largely concentrated on the limestone quarries of the west and the slate quarries of Wales and the Lake District. Whilst Rossendale Groundwork's own booklet *The Changing Face of Rossendale; Building Blocks* (1985) is a useful introduction to the industry and the books by Rothwell on the Industrial Heritage of various Lancashire towns (Whitworth in particular) do include details of quarrying, no studies comparable to those in *Stainier* is known to have been carried out in respect of the

sandstone quarries of the central Pennines even though these have produced much of the very fabric the buildings and surroundings in which Industrialised societies worldwide have lived and worked. It is hoped that the various studies commissioned for the Valley of Stone project will fill this gap and that an opportunity can be found to draw them all together in an accessible format.

7.16 Although the archaeological resource regarding sandstone quarrying in Rossendale is considerable, due to the nature of the industry which is mainly an outdoor one, the number of standing buildings and /or their remains is at a premium. Therefore the Sawshed at Lee Quarry has provided an outstanding opportunity to study such a structure and the processes that it housed. It now seems clear that this early 20th century building comprised an electrically powered engine house bay and an adjoining bay which housed two sawframes fed by trolleys brought in from the quarry workings on railway lines and placed beneath the frames which straddled them. Whilst a number of questions remain to be answered the excavations have provided many useful insights into how the saw shed functioned. A surprising aspect of the excavation was the lack of artefacts located on the site. Almost all of them came from a rubbish dump outside the north-west corner of the building and virtually nothing from within the building. This may be illustrative of the value that both workmen and quarrymasters placed on their possessions. Another unforeseen aspect was the amount of levelling and drainage that had been installed in order to remove water from the site. Bearing in mind the sawshed's location beneath the adjacent hillside the working conditions must have been extremely wet providing another indication of the fortitude of the men who worked in these extreme conditions of the Pennine quarries.

7.17 Lee Quarry in particular comprises a rich archaeological resource indicative of how stone quarrying was carried out and developed during the industrial period. As it is now much used for recreational purposes it seems inevitable that some features within it may become of risk and it is recommended that the archaeologically sensitive areas of the quarry are subjected to a full photographic and topographical survey as soon as possible so that the characteristics and location of such features can be fully recorded.

8. ARCHIVING - See report of March 2010

9. BIBLIOGRAPHY

Abbreviations

LUAU Lancaster University Archaeological Unit
OS Ordnance Survey

UMAU University of Manchester Archaeological Unit

Unpublished manuscripts

J.M.Trippier Archaeological and Surveying Consultancy, 2010, *An Archaeological Recording and Monitoring Programme at Lee Quarry Sawshed, Bacup, Lancashire*
LUAU 1997, *Rossendale Quarries Lancashire: Assessment Survey*
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English Heritage, 1991, *The Management of Archaeological Projects,* 2nd edition, London
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Practice, Swindon
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Rothwell, M., 2008, *Industrial Heritage A Guide to the Industrial Archaeology of Whitworth*, Bridgestone Press
Stainier, P., 2000, *Stone Quarry Landscapes; The Industrial Archaeology of Quarrying,* Tempus

Maps

OS 1893, 1: 2500 scale Lancashire Sheet 72:15, Southampton
OS 1810, 1: 2500 scale Lancashire Sheet 72:15, Southampton
OS 1930, 1: 2500 scale Lancashire Sheet 72:15, Southampton
OS 1961, 1: 2500 scale Lancashire Sheet SD 8620, Southampton

APPENDIX 1: FIGURES

Fig. 1: Floor Plan

Fig 2: Elevation Drawings
(a) East and West Elevations
(b) North and South Elevations and Cross Wall

Fig 3: Saw Frame likely to be of a similar type to that used at Lee Quarry

Fig. 4: Photographic Register

Fig. 5: Photograph Location Plan

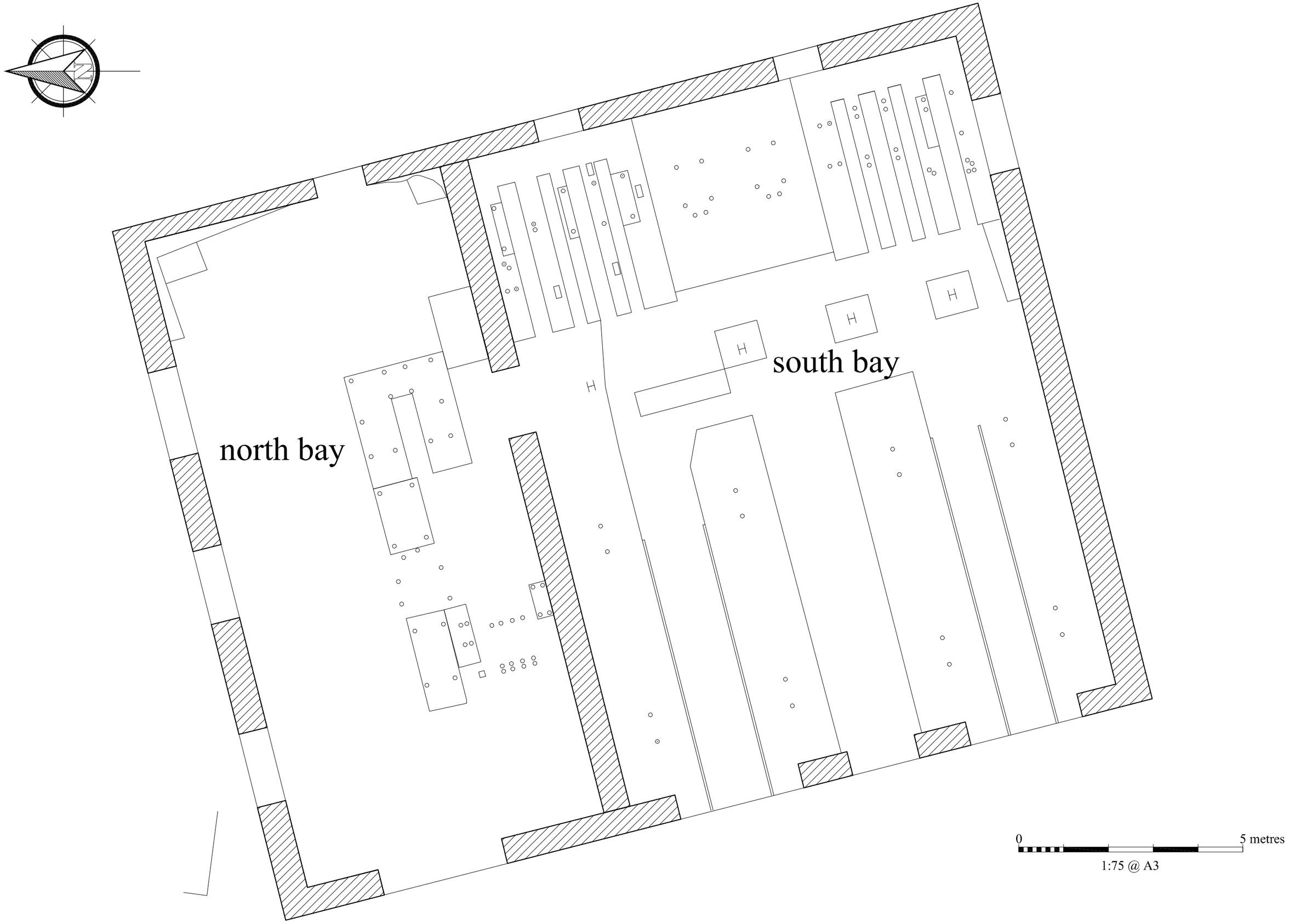
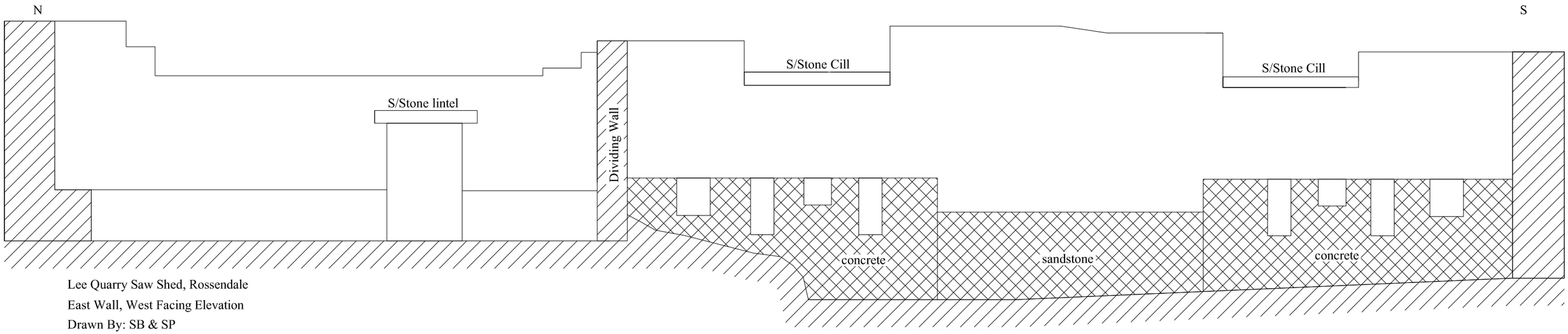


Figure Number 1: Saw Shed Plan



Lee Quarry Saw Shed, Rossendale
East Wall, West Facing Elevation
Drawn By: SB & SP
1:50 Scale

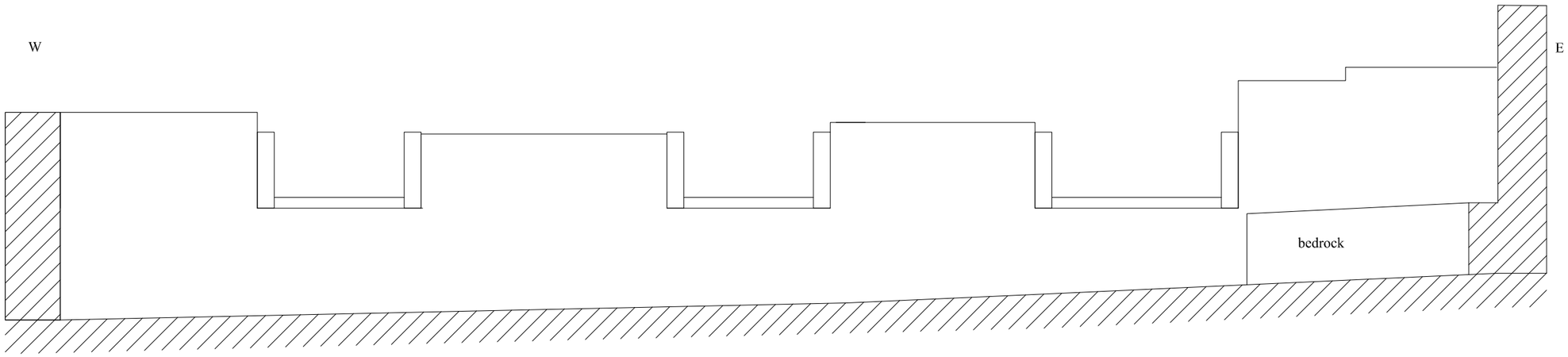
Lee Quarry Saw Shed, Rossendale
West Wall, West Facing Elevation
Drawn By: SB & SP
1:50 Scale

0 3m

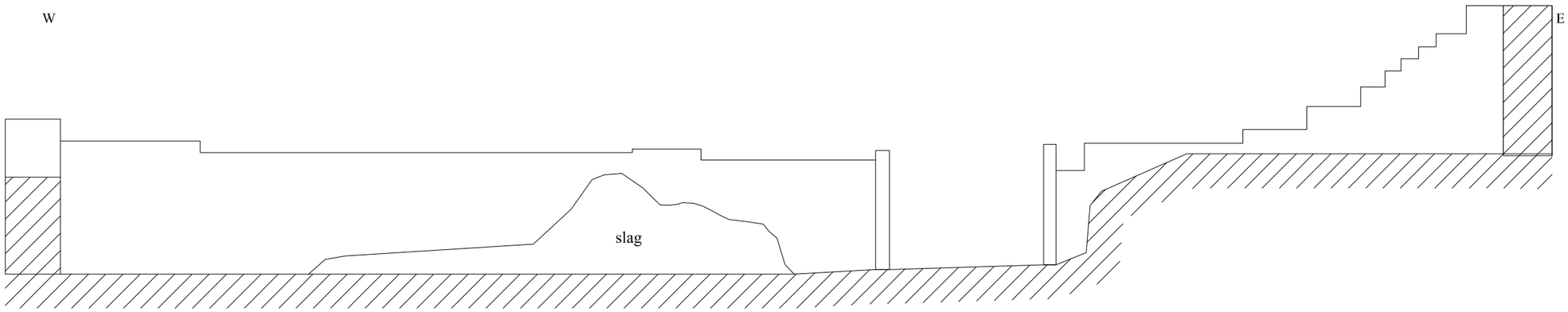
1:50 @ A3

Figure Number 2a Saw Shed Elevations

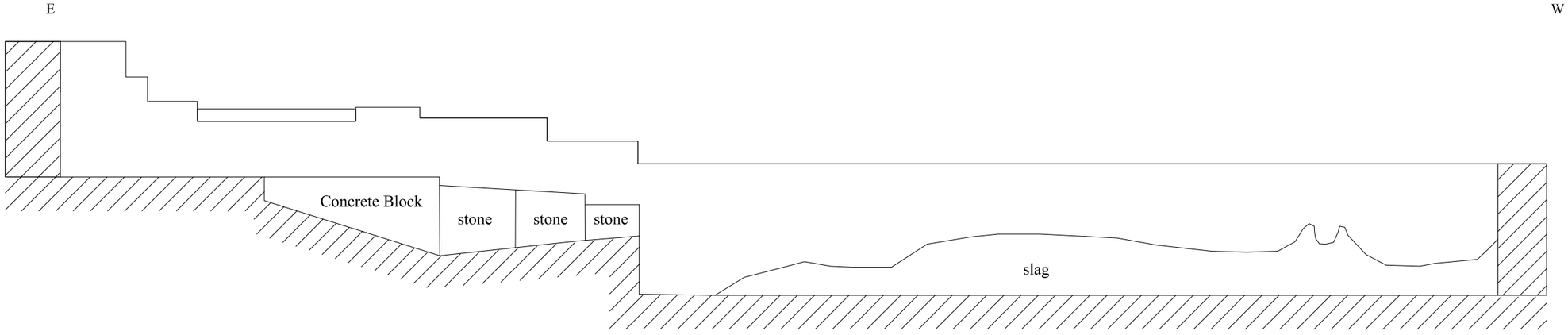
Lee Quarry Saw Shed, Rossendale
North Wall, South Facing Elevation
Drawn By: SP
1:50 Scale



Lee Quarry Saw Shed, Rossendale
Dividing Wall, South Facing Elevation
Drawn By: SP
1:50 Scale



Lee Quarry Saw Shed, Rossendale
South Wall, North Facing Elevation
Drawn By: SP
1:50 Scale



0 3m
1:50 @ A3

Figure Number 2b Saw Shed Elevations

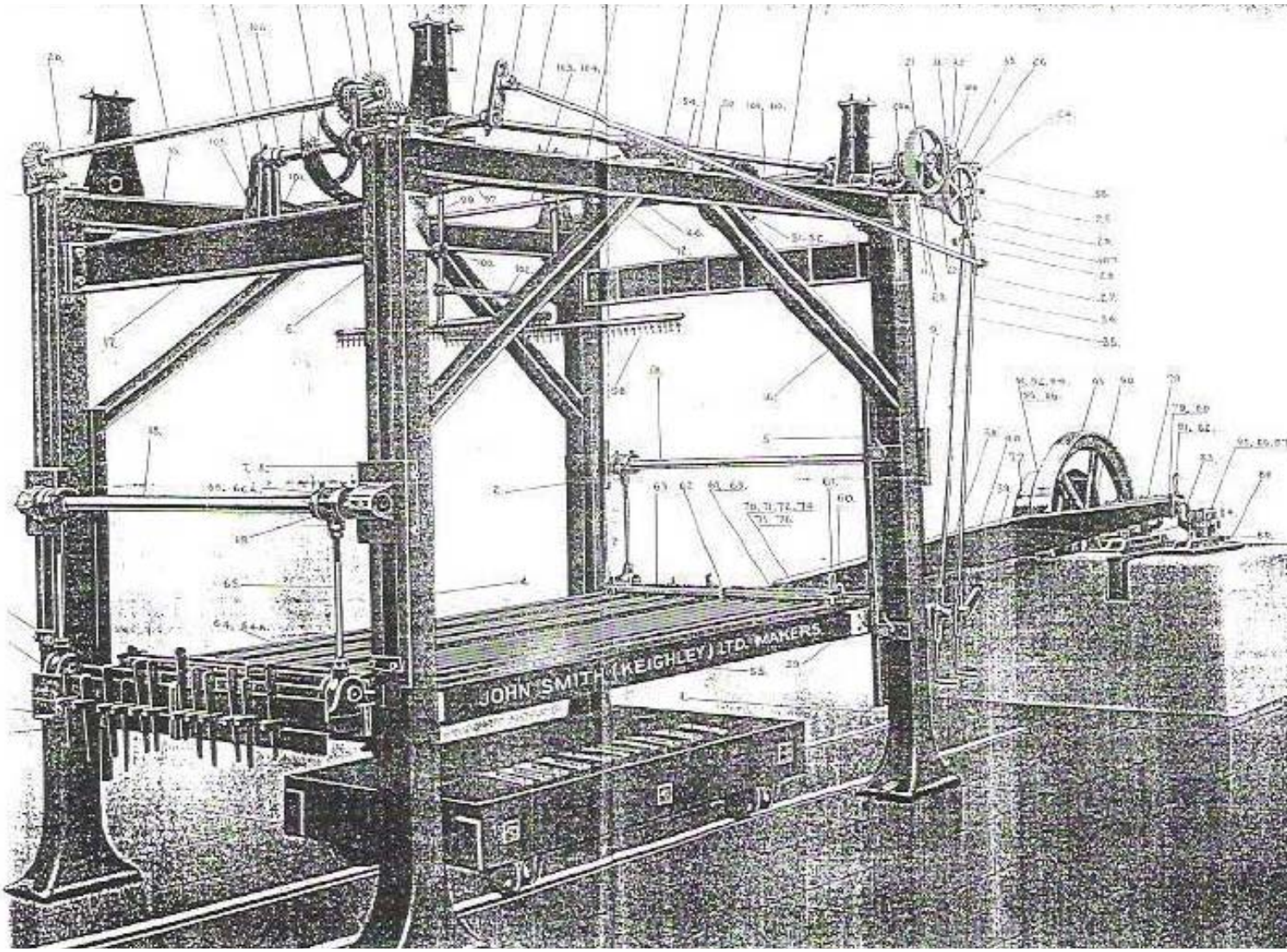


FIG 3: SAW FRAME LIKELY TO BE OF A SIMILAR TYPE TO THAT USED AT LEE QUARRY

FIG. 4: PHOTOGRAPHIC REGISTER (1 of 2)

Plates In Report	Monochrome Prints Film/Frame	Description	Direction Of Shot (towards)
1	1/002	View of Sawshed prior to excavation and conservation	NE
2		Beginnings of clearance work using mechanical diggers	NE
3		Beginnings of clearance work using mechanical diggers	N
4	1/003	Artificial mound after reduction	N
5		Base of artificial mound	NE
6		Base of artificial mound removed to allow for excavation of drainage channel	NE
7		New drain excavated at base of north wall (manhole surround replaced)	NE
8		Excavation of trench for new drain at base of south wall	NE
9		Removal of unfinished manhole surround to allow excavation of drain at base of artificial mound	NE
10	1/014	Mechanical artefacts found in dump below unfinished manhole surround	SE
11		Rear (east) wall of north bay substantially overborne by adjoining hillside	E
12		Detail of rear (east) wall of north bay	SE
13	1/007	Overburden from adjoining hillside removed from east wall of north bay	SE
14	2A/003	Adjoining hillside stabilised with large stone blocks	SE
15		Remaining rubble being removed from north bay after excavation of east wall	E
16		Remaining rubble being removed from north bay after excavation of east wall	E
17	2/007	The wrong colour of mortar!	NW
18		Dividing wall between bays after repointing. Concrete haunching being laid by Duncan as Anthony looks on.	SW
19		An example of gravel filling to wall top	W
20		Detail of artificial wool covering and concrete haunching over	SE
21	1/024	Work progresses on the removal of the overlying rushes in the south bay	NW
22	1/017	Remains of a crane jib amongst the debris in the south	SE

		bay	
22		Remains of a crane jib rescued from the debris in the south bay	
24	1/013	Rail lines discovered outside entrance to the south bay	NE
25	1/025	Uncovering the concrete pads in the interior of the south bay	NE
26		Uncovering the concrete blocks in the south bay in deteriorating weather	NE
27		The excavated saw shed looking north east	NE
28		The excavated saw shed looking north west. 2	NW
29	2A/014	Window with splayed jambs in north elevation.	N
30	3/023	Fragment of wired glass from window in north elevation	
31	2A/013	Detail of window jamb in north elevation highlighting in-situ glazing pin	NE
32	2A/009	Window with splayed jambs in north elevation and natural rock wall base in north-east corner	SE
33	2A/012	East end of north bay. NB natural rock wall base and bogey wheels. This photo also shows the rocks used to stabilise the hillside above	E
34	2A/022	View of north bay from west showing concrete machine bases	E
35	3/010	View of bases of roof stanchions in south bay	S
36		Bases of roof stanchions in south bay encased in concrete. NB also doorway in wall between bays	SE
37		A pile of 'shot' lies against the dividing wall in the foreground just west of the personnel doorway between the two bays	NE
38	2A/024	The rail tracks entering the north door of the south bay	NE
39	2A/026	The rail tracks entering the south door of the south bay	NE
40	2A/030	The rail tracks between the elongated concrete platforms within the south bay	NE
41	3/009	The rail tracks within the south bay surrounded by the four pads that would have supported the saw frame.	SW
42	3/007	One of the four pads that would have supported the saw frame	S
43	2A/017	: One of the blades from the saw machines was recovered and has been placed on the east wall of the south bay. NB also the grooved concrete blocks	SE
44	2A/016	A more detailed view of the grooved concrete blocks	NE
45	3/002	The tops of the grooved concrete blocks showing the numerous fixing pins and plates	NW
46		Some of the miscellaneous artefacts discovered. Now on display in the north bay	NE
47	2A/019	Artefacts discovered which appear to be from the saw frames and now on display in the south bay	NE
48		Jib balances to west of Sawshed	

FIG. 4: PHOTOGRAPHIC REGISTER (2 of 2)

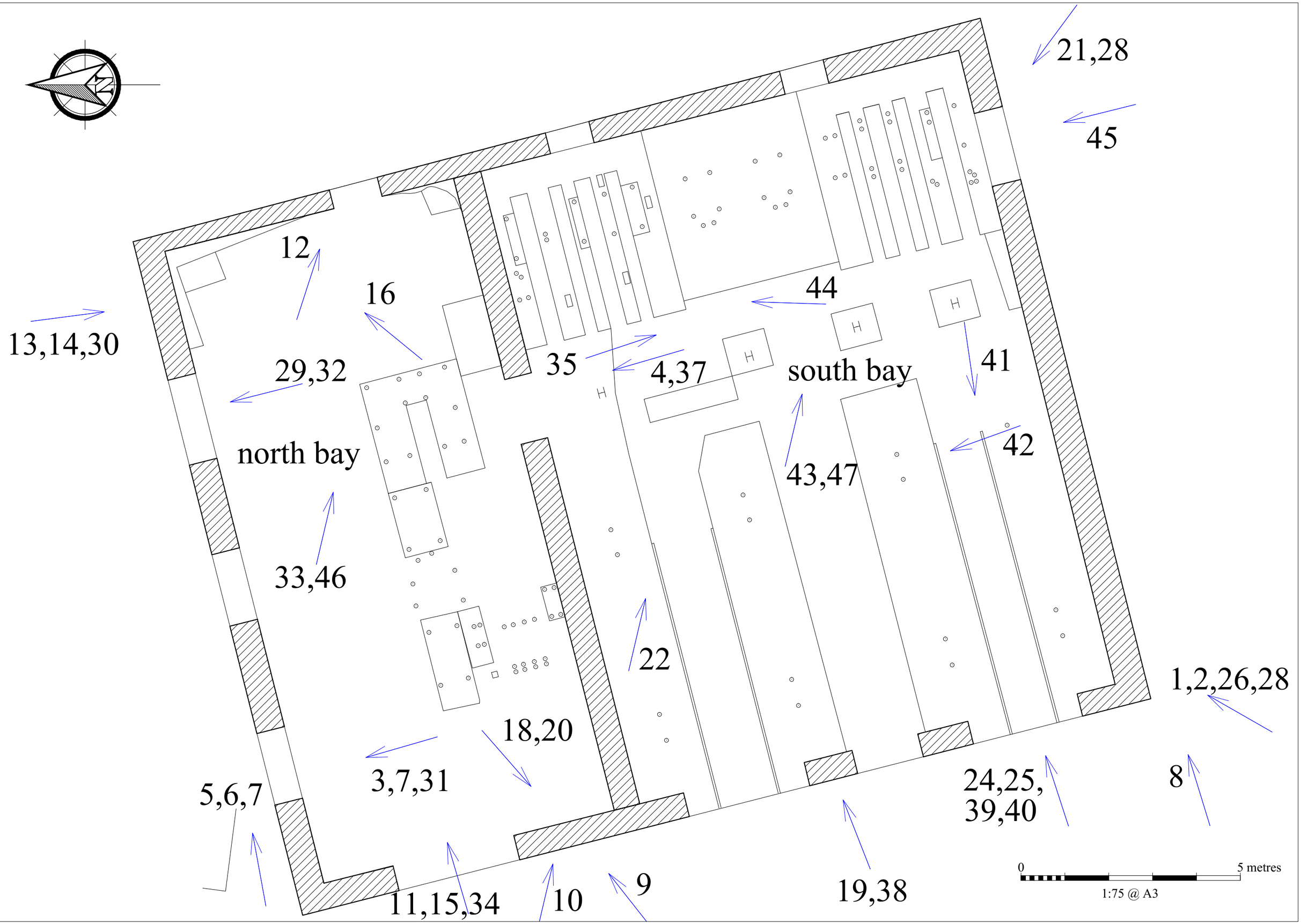


Figure Number 5: Saw Shed Photo Location Plan

Appendix 2: Plates

Plate 1: View of Sawshed prior to excavation and conservation. The grass covered artificial mound lies beyond. Note unfinished manhole surround resting against wall at extreme left of photo

Plate 2: Beginnings of clearance work using mechanical diggers. The grass covered artificial mound has already been reduced.

Plate 3: Artificial mound beyond north wall prior to reduction

Plate 4: Artificial mound after reduction

Plate 5: Base of artificial mound

Plate 6: Base of artificial mound removed to allow for excavation of drainage channel

Plate 7: New drain excavated at base of north wall (manhole surround replaced)

Plate 8: Excavation of trench for new drain at base of south wall

Plate 9: Removal of unfinished manhole surround to allow excavation of drain at base of artificial mound

Plate 10: Mechanical artefacts found in dump below unfinished manhole surround

Plate 11: Rear (east) wall of north bay substantially overborne by adjoining hillside. The scale bar is on the front (west) wall of the shed

Plate 12: Detail of rear (east) wall of north bay. Scale bar rests on lintel of aperture excavated on Plate 13

Plate 13: Overburden from adjoining hillside removed from east wall of north bay

Plate 14: Adjoining hillside stabilised with large stone blocks

Plate 15: Remaining rubble being removed from north bay after excavation of east wall in Plates 13-14

Plate 16: North and east walls of north being rebuilt by Anthony and Duncan

Plate 17: The wrong colour of mortar!

Plate 18: Dividing wall between bays after repointing. Concrete haunching being laid by Duncan as Anthony looks on.

Plate 19: An example of gravel filling to wall top

Plate 20: Detail of artificial wool covering and concrete haunching over

Plate 21: Work progresses on the removal of the overlying rushes in the south bay

Plate 22: Remains of a crane jib amongst the debris in the south bay

Plate 23: Remains of a crane jib rescued from the debris in the south bay

Plate 24: Rail lines discovered outside entrance to the south bay

Plate 25: Uncovering the concrete pads in the interior of the south bay

Plate 26: Uncovering the concrete blocks in the south bay in deteriorating weather

Plate 27: The excavated saw shed looking north east

Plate 28: The excavated saw shed looking north west. The white gravelled area in the south bay marks the open drain which now holds a pipe debouching into the new drain outside the south wall.

Plate 29: Window with splayed jambs in north elevation. NB in situ glazing pin towards top of photographic scale

Plate 30: Fragment of wired glass from window in north elevation

Plate 31: Detail of window jamb in north elevation highlighting in-situ glazing pin

Plate 32: Window with splayed jambs in north elevation and natural rock wall base in north-east corner

Plate 33: East end of north bay. NB natural rock wall base and bogey wheels. This photo also shows the rocks used to stabilise the hillside above

Plate 34: View of north bay from west showing concrete machine bases

Plate 35: View of bases of roof stanchions in south bay

Plate 36: Bases of roof stanchions in south bay encased in concrete. NB also doorway in wall between bays

Plate 37: A pile of 'shot' lies against the dividing wall in the foreground just west of the personnel doorway between the two bays

Plate 38: The rail tracks entering the north door of the south bay

Plate 39: The rail tracks entering the south door of the south bay

Plate 40: The rail tracks between the elongated concrete platforms within the south south bay. The floor surface in between is flagged. NB some 'shot' still against the south wall.

Plate 41: The rail tracks within the south bay surrounded by the four pads that would have supported the saw frame. The base of one leg of the frame is still in situ

Plate 42: One of the four pads that would have supported the saw frame. The pins that held the leg of the frame in place are still in situ

Plate 43: One of the blades from the saw machines was recovered and has been placed on the east wall of the south bay. NB also the grooved concrete blocks

Plate 44: A more detailed view of the grooved concrete blocks

Plate 45: The tops of the grooved concrete blocks showing the numerous fixing pins and plates

Plate 46: Some of the miscellaneous artefacts discovered. Now on display in the north bay

Plate 47: Artefacts discovered which appear to be from the saw frames and now on display in the south bay

Plate 48: Jib balances to west of Sawshed

Appendix 3: Small Finds Catalogue

Site Lee Quarry Saw Shed	**Find No** 1	**Location/Context** Rubbish tip C-C outside NW corner of shed	**Format** jpeg	**Date of Record** 14/6/2010
Material Cast iron	**Period**		**Photo No** 2&3	**Recorded by** John Trippier

Description : Cog 60mm dia; convex; cylinder attached inside

Interpretation
Cog from top of saw machine. Part 20a on drawing of John Smith of Keighley's saw machine.

Site Lee Quarry Saw Shed	**Find No** 2	**Location/Context** Rubbish tip C-C outside NW corner of shed	**Format** jpeg	**Date of Record** 14/6/2010
Material Cast iron	**Period**		**Photo No** 5	**Recorded by** John Trippier

Description: Square base with two plates attached at right angles above containing a bearing; 3 holes in top of each plate; end ones for fastening base down? Central ones for holding bearing. An unsuccessful attempt has been made to hacksaw through latter.

Intrepretation
Pivot ? containing bearing

Site Lee Quarry Saw Shed	**Find No** 3	**Location/Context** Rubbish tip C-C outside NW corner of shed	**Format** jpeg	**Date of Record** 14/6/2010
Material Cast iron & brass	**Period**		**Photo No** 6	**Recorded by** John Trippier

Description: Cast iron cylinder with brass lining; smaller cylinder (not brass lined) attached at right angles to form a T-junction

Intrepretation: Pivot bearing –see part 66-66A in drawing of John Smith of Keighley's saw machine

Site Lee Quarry Saw Shed	**Find Nos** 4,5,6	**Location/Context** Saw blade in bay 2 of saw shed. Others in rubbish tip C-C outside NW corner of shed	**Format** jpeg	**Date of Record** 14/6/2010
Material Steel, Cast iron & brass	**Period**		**Photo No** 7	**Recorded by** John Trippier

Description: End of steel saw blade (left); cast iron link bar centre and wrought iron holding wedge (right).

Intrepretation: See end nearest viewer in drawing of John Smith of Keighley's saw machine

Site Lee Quarry Saw Shed	**Find No** 7	**Location/Context** In rubbish tip C-C outside NW corner of shed	**Format** jpeg	**Date of Record** 14/6/2010
Material Cast iron	**Period**		**Photo No** 7	**Recorded by** John Trippier

Description: Part of broken cylinder with smaller cylinder attached to plate inside and with central hole.

Intrepretation: Drum or drive wheel for drive belts

Site Lee Quarry Saw Shed	**Find No** 8,9,10	**Location/Context** In rubbish tip C-C outside NW corner of shed	**Format** jpeg	**Date of Record** 14/6/2010
Material Cast I ron	**Period**		**Photo No** 8	**Recorded by** John Trippier

Description: Jack hammer, spring and drill

Interpretation
Jack hammer for drilling stone in quarry

Site Lee Quarry Saw Shed	**Find No 11**	**Location/Context** In depression to south of shed where waste stone was dumped by our builders	**Format** jpeg	**Date of Record** 14/6/2010
Material Cast iron	**Period:**		**Photo No** 9	**Recorded by** John Trippier

Description: Two lengths of iron bar at right angles welded or forged to cylinder at junction.
Latter carries two U-shaped spikes with threaded ends.

Interpretation: Holder for telegraph wires and porcelain insulators.
Would have been attached to corner of building

Site Lee Quarry Saw Shed	**Find No** 12	**Location/Context** In rubbish tip outside NW corner of sawshed	**Format** jpeg	**Date of Record** 14/6/2010
Material Cast iron	**Period**		**Photo No** 10	**Recorded by** John Trippier

Description: Two items each comprising cylindrical tubes on circular bases joined by 600mm ties each ovolo shaped and with 3 bolt holes

Interpretation; Stands –purpose unknown

Site Lee Quarry Saw Shed	**Find No** 13	**Location/Context** In saw shed against north wall	**Format** jpeg	**Date of Record** 14/6/2010
Material Cast iron	**Period**		**Photo No** 11	**Recorded by** John Trippier

Description: Fragment of 10mm thick wired glass

Interpretation: Vibration proof window glass

Site Lee Quarry Saw Shed	**Find No** 14	**Location/Context** In rubbish dump against outside of north west corner of saw shed	**Format** jpeg	**Date of Record** 14/6/2010
Material Cast iron	**Period**		**Photo No** 12	**Recorded by** John Trippier

Description: 4 no cast iron cylinders with scored insides welded to bases which contain bolt holes –at least one more was also found

Interpretation: Sleeves for pivots (see find 3) and parts 7 & 8 in drawing of John Smith of Keighley's saw machine although base plates were somewhat larger in drawing

Site Lee Quarry Saw Shed	**Find No** 15	**Location/Context** In rubbish dump against outside of north west corner of saw shed	**Format** jpeg	**Date of Record** 14/6/2010
Material Cast iron	**Period**		**Photo No** 13	**Recorded by** John Trippier

Description: Elongated iron bar 550mm x 80mm. c. 300mm slot at one end then single round hole. At other end a small cylinder attached at hole for taking a handle or a pipe?

Interpretation
Connecting rod - part no 107 on drawing of John Smith of Keighley's saw machine

Site Lee Quarry Saw Shed	**Find No** 16	**Location/Context** In rubbish dump against outside of north west corner of saw shed	**Format** jpeg	**Date of Record** 14/6/2010
Material Cast iron	**Period**		**Photo No** 14	**Recorded by** John Trippier

Description: Segment of cylindrical rim with part of one spoke still attached. Another loose spoke also found

Interpretation: Crank - part no 53 on drawing of John Smith of Keighley's saw machine

Site Lee Quarry Saw Shed	**Find No** 17	**Location/Context** In rubbish dump against outside of north west corner of saw shed	**Format** jpeg	**Date of Record** 14/6/2010
Material Cast iron	**Period**		**Photo No** 15	**Recorded by** John Trippier

Description: Cylindrical bar c.250mm long, rounded at one end. Bolted to latter at right angles is a steel 'cone' which has two opposing oval holes

Interpretation: Water valve

Site Lee Quarry Saw Shed	**Find No** 18	**Location/Context** In rubbish dump against outside of north west corner of saw shed	**Format** jpeg	**Date of Record** 14/6/2010
Material Cast iron	**Period**		**Photo No** 17	**Recorded by** John Trippier

Description: Miscellaneous collection of spanners and files

Interpretation

Site Lee Quarry Saw Shed	**Find No** 19	**Location/Context** In rubbish dump against outside of north west corner of saw shed	**Format** jpeg	**Date of Record** 14/6/2010
Material Cast iron	**Period**		**Photo No** 18	**Recorded by** John Trippier

Description: 3 parts - Toothed brass roller assembly, roller sleeve and shaft

Interpretation: Ball race –part nos 85,86 and 87 on drawing of John Smith of Keighley's saw machine

Site Lee Quarry Saw Shed	**Find No** 20	**Location/Context** In rubbish dump against outside of north west corner of saw shed	**Format** jpeg	**Date of Record** 14/6/2010
Material Cast iron	**Period**		**Photo No** 19	**Recorded by** John Trippier

Description: Iron bar with horseshoe shaped attachment at one end; bolts at each end of horseshoe
L-shaped iron bar loosely bolted to main bar so that the parts can move against each other

Interpretation: Handle for changing directional movements of cables etc?

Site Lee Quarry Saw Shed	**Find No** 21	**Location/Context:** In rubbish dump against outside of north west corner of saw shed	**Format** jpeg	**Date of Record** 14/6/2010
Material Cast iron	**Period**		**Photo No** 21	**Recorded by** John Trippier

Description: Timber block; fitted with various bolts and impregnated with oil through use;
Block older than nuts indicating re use?

Interpretation: Mount for motor?

Site Lee Quarry Saw Shed	**Find No** 22	**Location/Context** In rubbish dump against outside of north west corner of saw shed	**Format** jpeg	**Date of Record** 14/6/2010
Material Cast iron	**Period**		**Photo No** 22-3	**Recorded by** John Trippier

Description: Rail line chair

Interpretation

Site Lee Quarry Saw Shed	**Find No** 23	**Location/Context** In rubbish dump against outside of north west corner of saw shed	**Format** jpeg	**Date of Record** 14/6/2010
Material Cast iron	**Period**		**Photo No** 24	**Recorded by** John Trippier

Description: Chains with scarved joints in links denoted by slight swelling at ends

Interpretation

Site Lee Quarry Saw Shed	**Find No** 24	**Location/Context**	**Format** jpeg	**Date of Record** 14/6/2010
Material Cast iron	**Period**		**Photo No** 25	**Recorded by** John Trippier

Description: Iron rod square section at one end, tapering at the other; Scale bar = 0.5 m

Interpretation: Possibly stone getting bar?

Appendix 4: Revised Lime Mortar Specification

Specification for hydraulic lime mortar mix at Lee Quarry

(supplied by Anthony Walmesley)

The information as to the materials and mix proportions are as follows;

3 x Fine crushed sand stone - from Johnson Wellfield quarry in Huddersfield
3 x 0 to 4 mm washed grit - from Marshals Scout Moor quarry in Edenfield, Lancashire
2 x St Astier Hydraulic Lime NHL3.5
.05 x Pouzzolanas (One tea cup per 8units above)

Data from St Astier web site below for information

(see appendix 5 of original report)

Natural Lime NHL 5 (Chaux 100 naturelle Pure) Product Data
St Astier Natural Hydraulic Limes (NHL)

Conforms to European Norms EN 459 and BS 459
Strength factor: 5 (Eminently hydraulic)
Residue @ 0.09 mm: 7%
Density (volumetric weight) typical: 700 gr. / litre
Available (free) lime $Ca(OH)_2$ after slaking: 20-22%
Shelf life: 8-12 months kept sealed and dry

Contains no additives.
Whiteness index: 67
Surface cover (cm^2per gram): 8000
Expansion : < 1mm
Residue of quick lime after slaking: < 1%

MORTARS	Compressive strengthN/mm^2				Elasticity Moduli (Mpa)		
MIX RATIO	EN459*	1 : 2	1 : 2.5	1 : 3	1 : 2	1:2.5	1 :3
7 DAYS		1.96	1.00	0.88	n/a	n/a	n/a
28 DAYS	5*	2.20	2.00	1.5	10800	1100	10000
6 MONTHS		7.31	5.91	5.31	18000	17050	16900
12 MONTHS		9.28	8.84	6.50	18510	17280	16150
24 MONTHS		10.81	8.81	7.8	21500	18020	17430
Consumption for $1m^3$ of mortar Kg. +/- 10%		350	280	233			
EN 459/BS 459 (mortar ratio 1:1 by volume, with ISO 679 Sand)							