six heritage

HERITAGE AND CONDITION INVESTIGATION

22 Great James Street, London WC1N 3ES

Owen Design Studio (on behalf of I.P.M Personal Pension Trustees Ltd)

SH-1024-01

2 October 2024

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INTRODUCTION

1.1 / Instruction

Six Heritage Limited undertook a heritage and condition survey at 22 Great James Street, London WC1N 3ES on 2 October 2024, following authorisation and instruction from Fiorella Nitrato Izzo (on behalf of Owen Design Studio) by email on 24 September 2024 at 14:49pm.

1.2 / Orientation

For the purposes of orientation, the front door was taken as facing east onto the street.

1.3 / Aim

The aim of this investigation was to determine the most probably date of construction (and any subsequent refurbishment works) of the existing pitched timber roof structure, and to determine the condition of existing timber elements prior to planning application and refurbishment; so that the structures may be refurbished to allow for sustainable occupancy of the building as a domestic dwelling with the minimum risk of damp or decay related issues, and while conserving historically important materials and maintaining the capital value of the property.

1.4 / Limitations

The detail to which structures have been examined can be seen within the following report. No liability can be accepted for defects that may exist in other areas of the building. Six Heritage have not inspected in detail and any areas within the property that were covered, unexposed or inaccessible at the time of survey and we are therefore unable to confirm the condition of materials within these areas. Certain cavities were inspected using videoscopes, however this was to ascertain gross characteristics rather than to provide detailed information. The recommendations within this report are included to advise and inform the design team(s) appointed by the client. The contents within this report do not imply that Six Heritage are adopting the role of Principal Designer in relation to Construction Design Management (CDM) 2015.

Note, access to investigate timber roof structures for heritage and condition was severely limited at the time of survey as no formal access was possible into the east and west pitched roof structures. Access was gained to these areas via the localised lifting of external roof finishes and the use of video-scopes, extendible cameras and thermography.

1.5 / Site personnel and report authors

Matthew Amis BA, MSc (Historic Preservation), MCIOB
Patrick Hughes MSc (Timber Building Conservation), MCIOB, Assoc.RICS

1.6 / External sources

Reference was made to drawings supplied by the client (Owen Architects drawings dated 23/12/2021) and those created by SH to identify the structural arrangement of the property.

Reference was also made to the following British Standards and external sources (NOTE: Sources are footnoted and referenced for ease of identification where specifically referenced in that section/paragraph. Other sources used to construct this report are listed below.):

- BS 7913:2013 Guide to the Conservation of Historic Buildings
- The London County Council Bomb Damage Maps 1939-1945, Laurence Ward
- 414-HC-0001-Historical_Context_2024 (supplied to SH by Owen Design)
- HEAG304: HE Advice Note 16, Listed Building Consent
- The London County Council Bomb Damage Maps 1939-1945, Laurence Ward
- Georgian Group Guides No.10 Roofs
- London Terrace Houses 1660-1860: A Guide to Alterations and Extensions, 1996
- English Heritage, Practical Building Conservation, Glass & Glazing 2011
- Nail Chronology: The Use of Technologically Derived Features, Tom Wells 1998
- The Norwegian and Baltic timber trade to Britain 1780-1835 and its interconnections" 2016.
- Discovering Timber-Framed Buildings" by Richard Harris, 1993
- The Conversion of Structural Timbers, Recognising Historical and Modern Techniques" by Joe Thompson in the Building Conservation Directory

2. HERITAGE ASSESSMENT

2A/ HISTORY AND CONTEXT

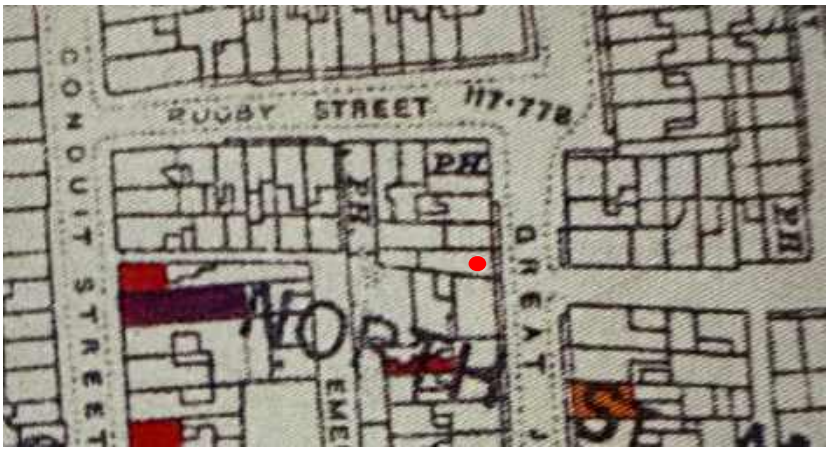
2A.1 / General history

22 Great James Street is an early Georgian terrace house originally dating to c.1720-24. No formal research was undertaken as part of this investigation, though several sources have been referenced in relation to the historical development and construction of the roof. These are listed in 1.6 above.

Reference should be made to 414-HC-0001-Historical_Context_2024 and Historic England Listing (No.1113200) for detailed social and developmental history of the structure. It was also noted that the building falls within the Bloomsbury Conservation Area offering it further local protections from alteration.

2A.2 / Bomb damage

Investigations on site and through available source material would suggest that the roof structure did not suffer any direct (or identifiable) damage during the Blitz (1940-1941). No identifiable burn marks or charring were noted to accessible timber elements at the time of survey, and almost all accessible timber elements were deemed to pre-date the Second World War. Site findings were further supported by the Bomb Damage Maps (Figure 1 below) owned by Six Heritage and as also referenced in 414-HC-0001-Historical_Context_2024.



RPT-Figure-1: 22 Great James Street (red dot) was not reported to have suffered any damage during the Second World War.

2A.3 / Context

The context of the existing roof structure is important to understand when determining the most probable periods of construction and alteration. The date of construction (1720-1724) places the property in the early Georgian period. Timber roof structures during this period were typically arranged in 'butterfly' style configurations with 2no. adjacent pitches often sharing a central valley gutter plate. Mansard type roof structures were also utilised during this period and were defined by each pitch being broken up into upper and lower sections[1]. Masonry parapets were also a common feature of Georgian

1. Drawn from several sources including "Georgian Group Guides No.10 Roofs" and "London Terrace Houses 1660-1860: A Guide to Alterations and Extensions, 1996"

architecture, primarily because of a 1707 Building Act which required a masonry wall ~18 inches in height to restrict the spread of fire[2].

Adjacent properties, and those dating to a similar period of construction of Great James Street, are configured in the 'butterfly' arrangement as seen in Figures 2 and 3 below. Valley gutters are typically finished in lead directing rainwater towards a central hopper through masonry parapet walling.

RPT-Figures-2 and 3: Roof structures to the south were arranged in a fashion typical to Georgian properties

It was also likely original roof structures dating to this early Georgian period would be clad in a clay tile variant rather than slate. Slate was not in widespread use within the capital until slightly later, during the mid c18th century.[3] As shown in Figures 2 and 3 above, clay tile and lead was prevalent across the remaining historic roof structures comprising Great James Street at the time of survey.

RPT-Figure-4: 22 Great James Street (red dot) was the only roof-scape in the street with a lantern between 2no. pitched roof areas

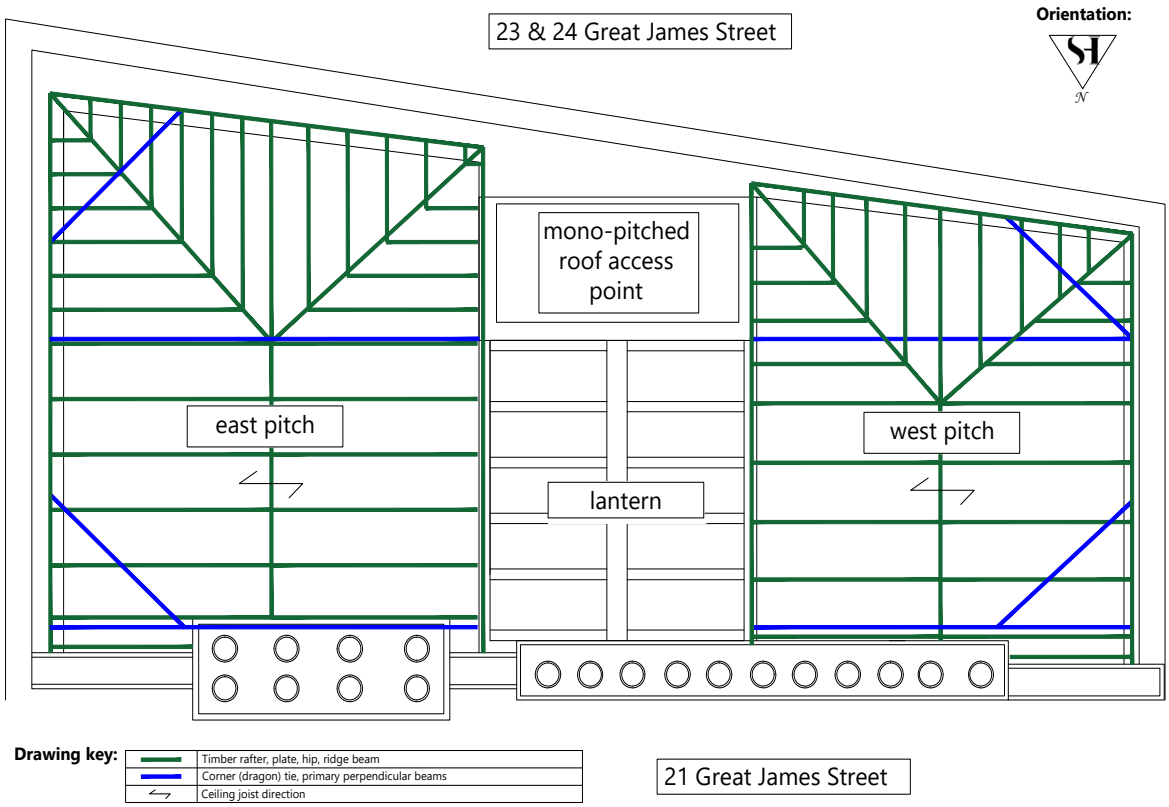
2. Spotter's Guide: The Early Georgian Townhouse - Historic England virtual tour https://historicengland.org.uk/campaigns/visit/walking-tours/spotter-guide-georgian-townhouse/
3. Drawn from several sources including "Georgian Group Guides No.10 Roofs"

Figure 4 above represents 22 Great James Street today (red dot) as well as its direct neighbours to the south. 21 and 20 Great James Street are arranged in a similar, if not identical, fashion to those seen elsewhere in the street in Figures 2 and 3 (though 21 has been finished in slate, likely dating to a later refurbishment). 22 Great James Street does carry several traits of Georgian roof structures of this period as described above, including parapet masonry and 2no. roof structures seperated by a central drainage channel. However, in no other property in the street or those of a similar period did Six Heritage identify another which had a lantern seperating the 2no. pitched roof areas. The cost and manufacture of glass (whether crown, cyclinder or plate) was also high and complicated during the period of original construction, futher suggesting the existing lantern was a 19th century construct when these materials became more common and accessible in England.[4]

Considering the items laid out above, it is deemed likely by Six Heritage that the current (2024) roof-scape had been altered since original construction.

2B/ STRUCTURAL AND MATERIAL ARRANGEMENT

2B.1 / Existing arrangement of pitched roof structure



RPT-Figure-5: Roof structure was divided into east and west pitches with hips to the south. See Drawings in Appendix II for more detail

The roof structure was comprised of east and west roof pitches divided by a central lantern and mono-pitched roof access point. In both pitches, common rafters were supported at their base by either parapet gutter plates (to the outside) or valley gutter plates (to the interior) and at their head by a ridge beam.

Generally speaking, pitched timber roof structures to the east and west were comprised of the following elements (as illustrated in Figure 5 above):

- ~36no. rafters to the east, ~27no. to the west
- 3no spans of rafter plate per roof structure
- 3no. spans of ceiling joist plates per roof structure

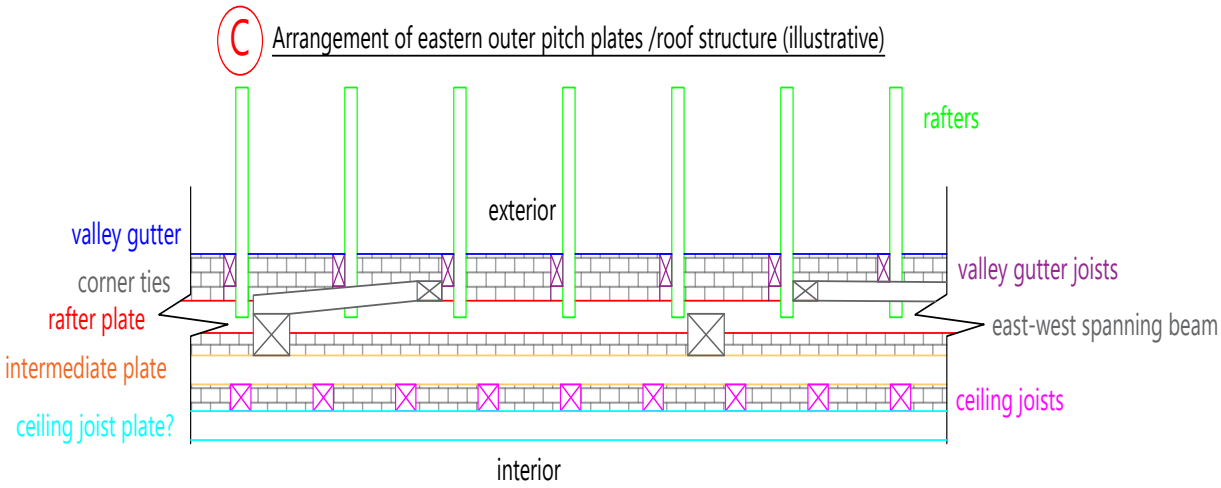
4. English Heritage "Practical Building Conservation, Glass & Glazing" 2011

- ~12no. ceiling joists to the east, ~10no. to the west
- 2no. corner (dragon ties) per roof structure
- 2no. primary ceiling/roof beams per roof structure (east-west)

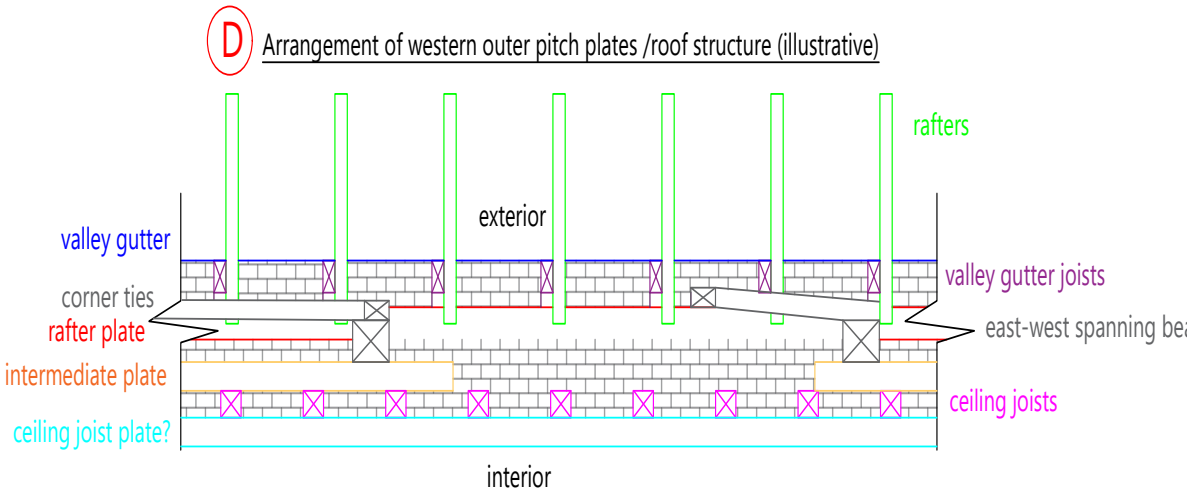
To the north and south, parapet gutter joists were nailed to the side of common rafters and supported at the parapet side by posts which bore onto the rafter plate below. It could not be determined whether or not parapet gutter joists also bore directly into the parapet masonry at the time of survey, though this was deemed likely. Multiple plates were noted to be associated with the roof structure to the east and west ends, with a lower embedded plate apparently supporting the east-west spanning beams. Ceiling joists appeared to be embedded within masonry walling but it could not be determined whether a plate was embedded beneath them at ceiling level. An illustration of this arrangement is represented in Figures 6, 7 and 8 below.

RPT-Figure-6: View of western parapet wall

RPT-Figure-7: View of eastern parapet wall



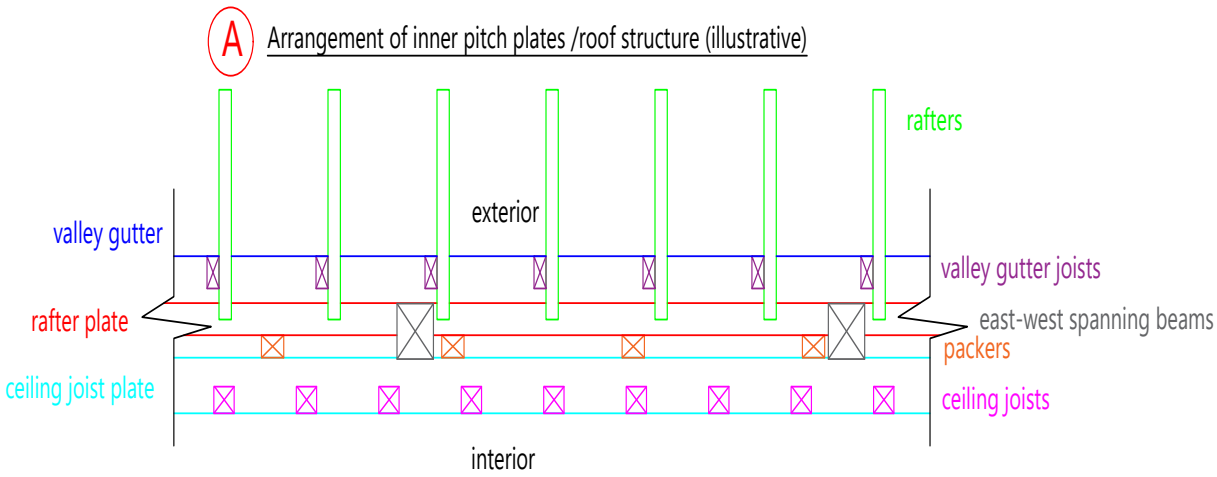
RPT-Figure-8: Illustration of structural arrangement at eastern parapet wall. See Drawings in Appendix II for more detail



RPT-Figure-9: Illustration of structural arrangement at western parapet wall. See Drawings in Appendix II for more detail

Rafters comprising the inner pitches of both the east and west roof voids were supported by individual valley gutter plates (spanning north-south), which in-turn was supported by packers atop a ceiling joists plate (also spanning north-south). An illustration of this arrangement is represented in Figure 7 below.

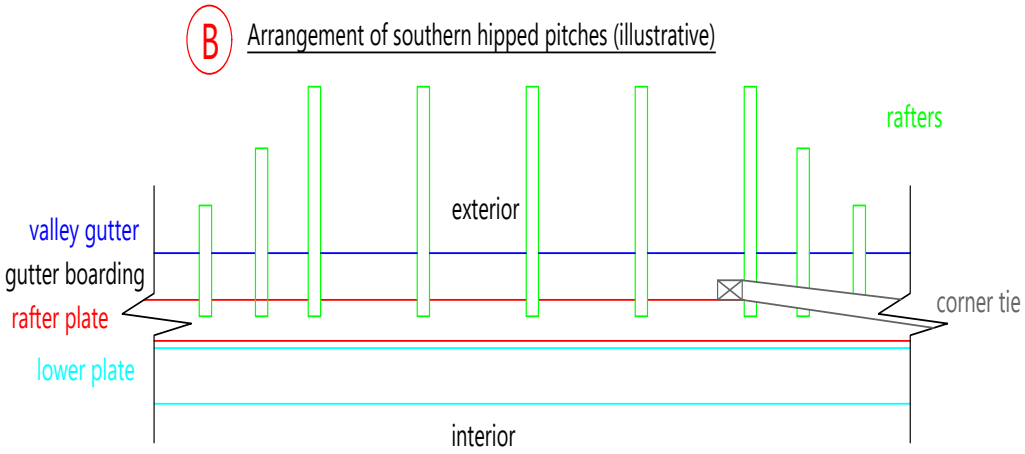
RPT-Figure-10: View of structural arrangement beneath central north-south valley



RPT-Figure-11: Illustration of structural arrangement to central pitches. See Drawings in Appendix II for more detail

The southern hip ends were comprised largely of jack rafters bearing onto a rafter plate. The rafter plate was noted to be bearing directly over a secondary, lower plate (as seen in Figures 12 and 13 below, the purpose of which could not be confirmed at the time of survey. It was likely the lower plate was installed purely to carry the load of the northern hipped pitches as they bore to the interior of the southern perimeter wall.

RPT-Figure-12: View of structural arrangement at southern, hipped pitches



RPT-Figure-13: Illustration of structural arrangement to southern, hipped pitches. See Drawings in Appendix II for more detail

As seen in images and illustrations above, in both roof voids 2no. east-west spanning beams were present, likely providing some degree of lateral support for the roof structure as well as a supporting role for the corner ties to the north. Corner ties, or dragon ties as they are often known, were present to the north-east and south-east corner of the east pitch, and the south-west and north-west corner of the west pitch.

Rafters supported non-historic, machine cut softwood cross-battens beneath nibbed clay tiles of various makers/types (Dreadnaught, Rosemary, Robur). A bituminous underlay was present to the west pitch of the eastern roof void dating to a contemporary refurbishment.

RPT-Figure-14: Non-historic, bituminous underlay was present to west pitch of eastern roof void

RPT-Figure-15: Several makers stamps/tile types were noted to be used over roof structure

2B.2 / Lantern and roof access point

A lantern and roof access point were present at the centre of the structure as laid out in Figure 5 above.

The roof access point was mono-pitched and finished in lead, draining rainwater to the west. The north and south cheeks of the access point had been finished in hung slate, which described in 2A above, was not commonly used throughout London in the c.1720s, further suggesting this may have been installed at a later date. A cistern/water tank was present inside the roof access point, a common feature of Georgian and Victorian terrace houses, though the presence of one does not necessarily alone confirm it to date to a later refurbishment.[5] The cistern had an overflow outlet that penetrated the south cheek of the dormer and into the drainage outlet. Ceiling joists spanned north-south supporting the heavy cistern bearing onto trimmers carrying the access hatch and into the southern masonry wall. Interiors within the roof access point had been finished in a

5. "London Terrace Houses 1660-1860: A Guide to Alterations and Extensions, 1996"

historical and traditional lime and horse hair plaster over hewn lath. Initial assessment of the nails used to secure laths in place suggested they were cut iron nails which from our experience and understanding, typically date to the c.19th century.[6]

RPT-Figure-16: Slate used to dress cheeks of roof access point

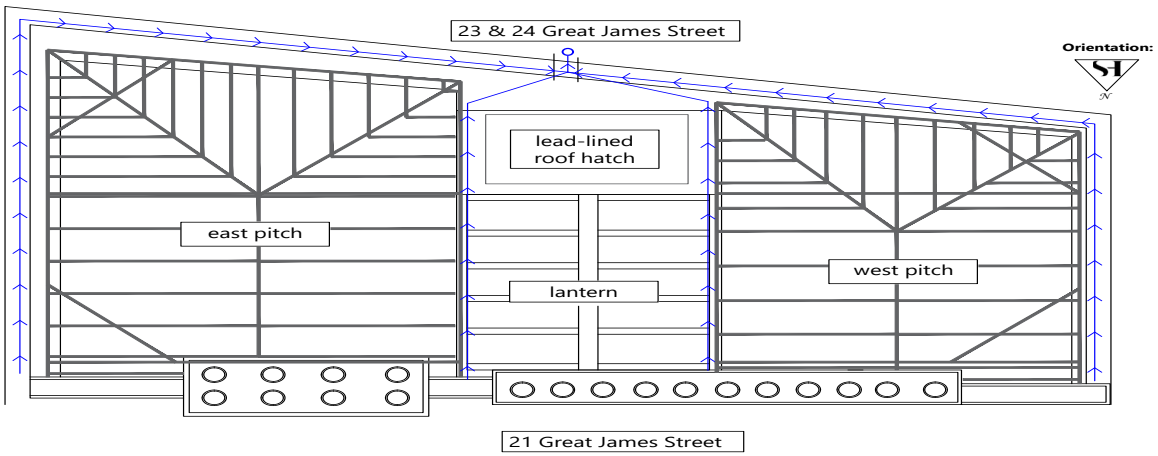
RPT-Figure-17: Cistern installed within roof access point, likely Victorian in nature

The lantern to the north was essentially comprised of 2no. elements; an outer shell and inner, glazed unit. The outer shell was of contemporary construction, pitched timber frame with double glazed sheets of glass and contemporary glazing bars and ridge capping. This was almost certainly of c.20th century construction. There was limited to no access to the structure supporting the inner glazed unit, though it was deemed likely roof elements described in 2B1 above were playing some sort of supporting role structurally.

RPT-Figure-18: Outer pitched roof structure over lantern non-historic

RPT-Figure-19: Limited access to lantern over stairwell at time of survey

2B.3 / Rainwater goods arrangement



RPT-Figure-20: Illustration of rainwater drainage arrangement. See Drawings in Appendix II for more detail

6. Reference was made to "Nail Chronology: The Use of Technologically Derived Features, Tom Wells 1998"

All rainwater falling over the high-level pitched roof structures was drained to 1no. downpipe through the southern masonry wall. As per Figure 16 below, historically 23 and 24 Great James Street to the south was lower than the 22, so it was likely that 22 drained its roof level rainwater onto the lower-level roof-scape of 23 and 24 to then be sequentially dispelled to ground level. Following the reconstruction of 23 and 24, these properties are now higher than 22 and the party wall extends up above eaves level. It appears the historical downpipe has now become embedded/encased in this party wall. The termination point and direction of this downpipe could not be identified at the time of survey. It should be noted that it appeared that the lantern and roof access point had been either an after thought or retroactively installed to the roof-scape as they clearly inhibited the roof-scape's ability to drain water towards the central, southern rainwater outlet.

RPT-Figure-21: 1946 photograph extracted from Historic Context report supplied to SH showing 22 originally higher than 23-24 to the south

Gutter linings were a non-historic metal rather than lead and had been finished in a remedial coating of some kind in an effort to prolong service life. The condition of rainwater goods is described in more detail in Section 3 below.

RPT-Figure-22: Soil pipe to the south had been encapsulated in masonry

RPT-Figure-23: Rainwater ran away to the south into an apparent internal/embedded downpipe

2c/ SITE OBSERVATIONS

2c.1 / Bracker's marks

1/ **Context:** Visual assessment of video and photographic evidence taken within the enclosed roof voids identified the presence of bracker's marks on the surfaces of certain structural timber elements. The characteristics of these markings and the timber species would suggest that these elements date to approximately the middle

of the 19th century.

2 / **Background:** The United Kingdom and mainland Europe had benefited from an international timber trade of both Softwood and Hardwoods since the Middle Ages. However, due to inherent restrictions brought about through a lack of technological advancement at the time this was fairly limited, and the majority of structural timbers were sourced from native forests and timber plantations. As the industrial revolution began metal and tool production improved, and wider advancements were made, associated with industry, shipping and importation, the timber trade also grew, with the pinnacle of this occurring in the middle of the 19th century.[7]

Purposefully made markings can often be found on timbers of varying chronologies and provenance, within the built environment. These have historically been applied using various methods such as carving, stamping, incising, painting or drawing with materials such as chalk or wax. The marking of timbers is generally to distinguish the quality, dimensions and location of origin of the imported timber product. In the past, these marks were devised by individual sawmills and intermediaries with limited reliability, consistency or adherence to agreed standards. The Baltic states first utilised the official use of bracker's who would grade and mark timbers at the port prior to export. At first this was restricted to Hardwoods, until the middle of the 19th century when Softwoods were included within the grading criteria,

"Although this official system was first introduced for oak exports (pinewood had no port marks until the 1840s)".[8]

3 / **22 Great James Street:** As can be seen in Figures 23 and 24 below, the visible bracker's marks are located at the approximate mid-section of the rafter and a partial triangle is visible, as well as some other unidentified markings. This indicates that these are port marks, and that the timber likely originated from the Baltic states, possibly Riga. Further evidence for the origin of the timber being the Baltic states is the use of a race knife to inscribe them.

RPT-Figure-24: Bracker's marks were visible to rafters in both pitches

RPT-Figure-25: Bracker's marks were worn in some areas though still visible

"The port marks applied by official brackers in Danzig, Riga, Memel and Stettin are the easiest to understand. These distinctive signs were inscribed into the timber with a rase knife, which was adopted not only by official brackers, but also by timber exporters based on the East and South coast of the Baltic Sea."[7]

2C.2 / Jointing and structural details

Visual assessments of the structural arrangement within each void noted that certain common rafters were secured to rafter plates using differing jointing methods, such as birds mouth and seat cuts (mitred butt joints) which could suggest some rafters were from various phases of repair/refurbishment. Furthermore, notches/housings to the

7. Reference was made to "The Norwegian and Baltic timber trade to Britain 1780-1835 and its interconnections" 2016.
8. "Baltic shipping marks on nineteenth-century timber: their deciphering and a proposal for an innovative characterization of old timber. Construction History", Vandenabeele, L., Bertels, I., & Wouters, I. (2016)

rafter plates were identified, within which the birds mouth joints of common rafter were located. These were seen to be ill-fitting and possibly indicative of the replacement of rafter elements at a later date. In addition to the varied jointing methods, further visual assessment of common rafters noted that they appeared to be of differing section sizes, which again may indicate varying chronologies.

Both roof structures featured corner ties that provided additional support to the joint junction between the rafter plates and hip rafter foot, preventing the weight of the roof from separating the structure at this location. Richard Harris mentions in his publication – "Discovering Timber-Framed Buildings" that "Another detail that was well established by the late eighteenth century was the use of corner and dragon tie-beam assemblies in the construction of hipped roofs." (Harris, R. 1979. p.86). Whilst these may have been installed during initial construction, it is also possible that they were installed later judging by Harris' statement.[9]

RPT-Figure-26: Birds mouth jointing noted to majority of rafter feet

RPT-Figure-27: Differing jointing methods noted in localised instances

2c.3 / Saw marks

1 / **Background:** Timber conversion markings are a useful by-product left from original conversion/construction and help to build an image of the chronology and alterations that may have been made to a building. Prior to the industrial revolution in the late 18th century, conversion of structural timber was carried out using hand-conversion methods.

The act of cleaving is the earliest method of converting felled trees into individual lengths of structural timbers. This was achieved through the use of wedges that were driven into the timber using mallets to split it longitudinally. The timber will naturally split along the grain leaving a distinctive, inconsistent ridged finish, with areas where interlocking or opposing grain directions have caused 'tear out'

Hewing is the act of using an assortment of axes to 'square-up' a length of timber. This leaves a slightly undulated, scalloped surface on the timber, as well as small areas of 'tear out' particularly around locations where there will be interlocking or opposing grain directions such as knots. Hewing became most popular between the 13th and 15th centuries, however many properties built between the ~13th to early 20th centuries often have hewn timbers present, however hewing became rarer as timber and tool quality increased.

See-sawing first appeared around the 12th century, this method sees the timber inclined at an angle upon a single trestle. Once the approximate mid-section of the timber was reached, it was pivoted and cutting began from the other end. The markings left by this sawing method are typically at ~50–70 degrees to the length of the timber with opposing angled saw marks converging at the middle of the timber, depending on how the timber was then further converted, sometimes a small

9. Reference made to "Discovering Timber-Framed Buildings" by Richard Harris, 1993

triangle of cleft wood can be seen at the centre, which held the waste timber in place until it was ready to be removed after sawing had finished

Pit and trestle sawing became prominent between the end of the 14th century to the middle of the 16th century. This method saw the timber laid horizontally atop two trestles, or above a pit, within which one sawyer stood, with the second positioned on top of the timber to be cut. This method of conversion can be identified by the saw marks that are approximately 75-85 degrees to the length of the timber, with irregular distances and deviations in angle and prominence of marks as the saw angle was changed and speed and intensity of the sawing changed. Additionally, there is often a small section of cleft timber at one end which was separated once sawing had finished

Mill sawing first appeared around the 17th century and utilised wind or waterpower to drive the reciprocating saw blades. Timbers that have been converted using this method feature saw marks that are about 90 degrees to the length of the element and are evenly spaced with no cleft section

The use of circular saws to convert timber first arrived during the late 18th century to early 19th century, with regularity of use becoming more prominent from these dates to the present day. Timbers that have been converted using this method feature easily identifiable sweeping saw marks, which depict the profile of the circular blade

Band sawing is the last standard method of mechanical timber conversion to be invented. This method was devised in approximately the mid 19th century. The sawn conversion marks are seen to be 90 degrees to the length of the timber and can often be widely spaced, these marks can also often look similar to mill sawn timbers.[10]

2 / **22 Great James Street:** Upon investigation it was noted that a variety of conversion methods had been used to convert the structural timbers that were present within the roof voids. Several elements at ceiling level, including suspended timber beams appeared to feature the characteristic markings left by hewing.

RPT-Figure-28: Different generations of timber were noted within roof voids

RPT-Figure-29: Saw marks were visible to accessible timber elements at time of survey

Irregular saw marks on other elements, particularly certain large beams within the ceiling structure that also featured redundant mortises, as well as certain common rafters suggested these had been trestle sawn. However, with regard to the common rafters it could be that these had been initially converted using more modern methods and then further converted to smaller dimension on-site, for use as rafters.

A timber beam beneath the hip-end of the west roof void featured what appeared to be sweeping saw marks that were consistently, closely spaced. Because of these it was deemed possible that this had been converted using circular sawing.

At least two beams that spanned north/south either side of the roof access hatch and

10. Reference was made to the article "The Conversion of Structural Timbers, Recognising Historical and Modern Techniques" by Joe Thompson in the Building Conservation Directory

the lantern, were seen to have what appeared to be possible band saw marks. These timbers also featured a very smooth and consistent surface and uniform section size which further hinted at mechanical conversion, possibly by a band-saw, although access to the roof voids was limited

2C.4 / Surface coatings

It was noted during investigations that numerous timbers appeared to feature a dark brown surface coating, which suggested that these had possibly had chemical preservatives such as Creosote applied to them. Creosote is a chemical product formed by the combination of numerous chemicals, which was discovered by Karl Von Reichenbach in 1832. The fact that this did not appear to be present on all timbers suggested that it may have only been applied to those elements that had been used during a later period of refurbishment/alteration.

RPT-Figure-30: Timber elements comprising rafters and ridge beam had a fairly uniform colour/ hue

2C.5 / Further evidence of alteration

1 / **Ghost marks:** No ghost marks were identified to masonry structures (such as parapets or chimney-stacks) at the time of survey which would suggest the roof pitches had been moved or altered since original construction. Localised areas of re-pointing were noted on the chimney-stacks, adjacent to the east pitch of the west roof structure, however the shape of this did not align accurately enough for it to be considered sound evidence of a change in roof pitch. Furthermore, there was no evidence internally that the ridge board had originally been at a different height to that seen during the time of survey.

2 / **Ceiling finishes:** During assessments of associated materials, it was noted that the ceilings within both rooms beneath the east and west roof voids featured plasterboard ceiling cladding. This indicated that historical lath and plaster had been removed at some point throughout the second half of the 20th century to the present day (likely including the removal of historical roof void access hatches).

3 / **Redundant mortises:** Visual investigations within the roof voids identified the presence of several beams that featured empty mortises. This suggested that the configuration of ceiling joists may have been altered at some point, thus making the mortises on the beams redundant. However, the positioning of these beams suggested that it was more likely that these had been re-purposed from a previous structure, such as a floor lay-up, and used as a structural element within the roofs/ ceilings. These beams were seen to be a dark brown colour which contrasted with other beams within the voids that were deemed to likely be original, which were lighter with visible grain patterns. The dark brown colouration of the beams that featured the redundant mortises suggested that they may have been treated with creosote prior to installation. Furthermore, the saw marks on these beams suggested that these had been converted using pit or trestle sawing, which was in contrast to an adjacent beam that was seen to have marks suggesting conversion via hewing, which may have been from a different period of refurbishment/alteration.

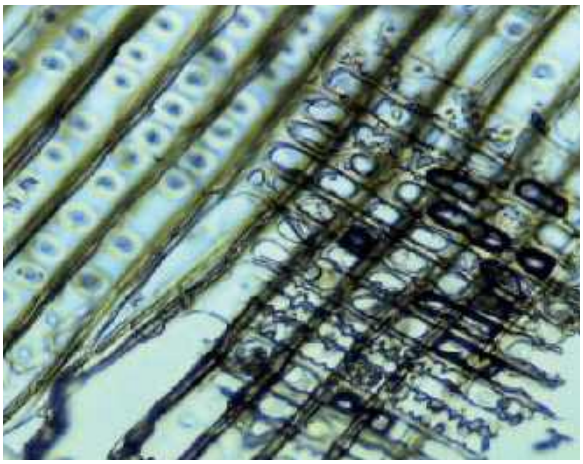
2D/ TIMBER SPECIES IDENTIFICATION AND MATERIAL ANALYSIS

2D.1 / Microscopic analysis of timber species

A total of 2no. samples were extracted from structural timber elements (rafter and upper rafter plate) using a low-speed battery powered drill. These samples were returned to the in-house laboratory for study under a microscope to ascertain species.

2D.2 / Material analysis

Microscopal analysis of timber samples taken at the time of the survey were all found to be European Redwood (*Pinus sylvestris*). The softwood nature of the timber elements does not necessarily date them to any specific period, though generally aligns with the information laid out in Section 3C above.



RPT-Figure-31: Samples were identified as Pinus sylvestris upon microscopal examination

2E/ SUMMARY OF HERITAGE INVESTIGATIONS

2E.1 / Summary of heritage investigation

As outlined in Section 2 above, site investigations and desk-based research have led Six Heritage to form the following conclusions as to the construction and evolution of the pitched timber roof structures over 22 Great James Street:

1 / In the opinion of Six Heritage, the existing pitched timber roof structures are comprised of a number of generations of timber elements. According to the evidence laid out in Section 2 above, Six Heritage believe it is most probable that the majority of the structural timber elements (rafters, hips, ridges and plates) are Victorian (likely mid c.19th century) in nature and therefore not original. It is also the opinion of Six Heritage that it is likely some more historic (c.18th century) / potentially original timber elements remained at the time of survey comprising elements within the ceiling structure, east-west spanning beams as well as potentially sections of wall plate and the corner/ dragon ties. These elements could have been re-purposed from elsewhere or re-used following a past refurbishment.

2 / Six Heritage are of the opinion that the evidence suggests the roof-scape was not originally constructed in the format it exists in today; it is deemed more probable than not that the lantern and mono-pitched roof access point were installed during a c.19th century refurbishment (likely as part of the larger works to refurbish the structural timber elements described in 1 above). It should further be noted that there was little

evidence to suggest (one way or the other) whether or not the hip ends to the south had always been configured in this manner or whether they had been installed as part of the later, Victorian refurbishment. Evidence to support both theories can be found in Section 2 above and Six Heritage do not have a set opinion one way or another following initial investigations.

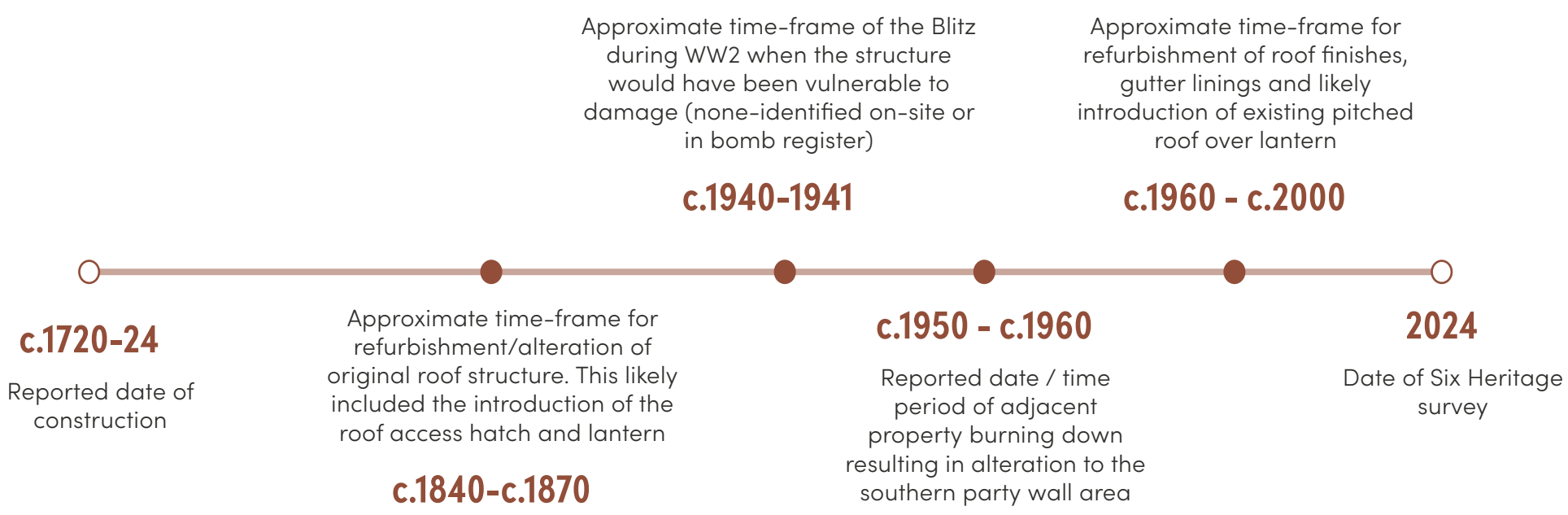
3 / A refurbishment had clearly been undertaken during the second half of the c.20th century to the exterior envelope over the pitched timber roof structures. These works included the replacement of clay tile roof finishes, introduction of machine cut softwood cross-battens, metal gutter linings, lead-work, plasterboard ceiling finishes and likely the introduction of a glazed roof structure over the roof lantern. There was no evidence to suggest that this refurbishment involved the repair or replacement of any structural timber elements comprising the roof pitches.

4 / An approximate time-line of construction and refurbishment can be seen in Figure 32 below. Further access may provide further clarity/accuracy to this time-line and the overall assessment if so requested/instructed in the future.

5 / It should be noted that, as laid out in Section 3 below, localised historical and ongoing decay had/was occurring to structural timber elements comprising the pitched roof structures and remedial works are recommended to rectify these issues.

ESTIMATED TIME-FRAME OF CONSTRUCTION

RPT-Figure-32



3. TIMBER CONDITION SURVEY

3A/ PITCHED ROOF CONSTRUCTION

3A.1 / Limitations

Access to investigate timber roof structures was severely limited at the time of survey. No formal access was possible into the east and west pitched roof structures. It is likely historical access hatches into these roof voids had existing to third floor ceiling structures which had since been replaced with contemporary plasterboard. Therefore, access was gained to these areas via the localised lifting of external roof finishes and the use of video-scopes, extendible cameras and thermography.

3A.2 / Materials

See Section 2D above. Timber roof structure supporting clay tiled roof finish, metal gutter linings with external coatings and lead flashing.

3A.3 / Construction

1 / **General:** Construction of the pitched roof structures is laid out in detail above in Section 2. Generally speaking and for ease of reference the following summary has been formulated:

Both roofs were longitudinally oriented north/south and hipped at their south ends. The timber structure was primarily formed of common rafters that spanned between rafter plates at eaves level and a ridge board at the apex, which was embedded at its north bearing end into the brickwork that formed the chimney-stacks. Two Georgian hip rafters were again jointed between the ridge board and rafter plate, and these provided longitudinal rigidity in the absence of side-purlins. Additional beams were noted beneath rafter plates and several areas featured embedded plates of smaller section size, to support the embedded bearing ends of suspended primary beams that spanned the voids, as well as the embedded bearing ends of the ceiling joists that were oriented east/west. Furthermore, diagonal ties (corner ties) were identified at the corners of the hip-end, these would have been used to reinforce the corners of the roof structure and rafter plate, as the hip rafters would be a major load path for the distribution of weight, which would be directed towards an inherent weak point. Plain clay tiles were secured to horizontal roofing battens

2 / **Dimensions:** The following dimensions were recorded from accessible timber elements at the time of survey (access limited):

Dimensions of accessible timber elements (approx.)	Size (mm)
Common rafters	~100 x 95mm at ~475mm centres
North-south trimmer	~270 x 125mm
Roof hatch ceiling joists	~75x 50mm at ~480mm centres
Roof hatch common rafters	~45 x 55mm at ~275mm centres
Ceiling level beams (2no. per void)	~150 x 170mm

Table 1: Summary of approximate dimensions collected from roof structures

As noted in Section 2 above, the pitched roof structures had been subject to a history of repair and refurbishment since original construction.

The following defects were identified at the time of survey.

- Decay was provisionally identified to ~6-10no. rafters due to ongoing and historical wet rot decay.
- Decay was provisionally identified to ~6-10no. parapet gutter rafters due to ongoing and historical wet rot decay.
- Rafter plate was provisionally identified as being decayed for ~3m in total over at least 3no. areas of the entire roof structure.

RPT-Figure-33: Clear damp staining was visible to timber elements to the east

RPT-Figure-34: Wet rot was noted at high level to the east due to external defect

- Evidence of moisture staining and interstitial mould growth was noted within both roof voids, primarily to rafter elements. This was provisionally credited to the fact that intermittent water penetration had/was occurring to the roof structure combined with the fact that there was no formal provision for ventilation throughout the roof voids. Some informal ventilation was afforded between tiles as there was generally no underlay present. An impermeable underlay was present to the eastern pitch of the western pitched roof dating to a non-historic refurbishment

RPT-Figure-35: Interstitial condensation was noted to several timber elements comprising the roof structures in both voids

RPT-Figure-36: Interstitial condensation was noted to several timber elements comprising the roof structures in both voids

- Roof voids were all contaminated with potentially hazardous dust and debris which was visible to the topside of the plasterboard ceiling finishes.

RPT-Figure-37: Debris was noted to the topside of ceiling finishes in both voids

RPT-Figure-38: Debris was noted to the topside of ceiling finishes in both voids

- Localised defects to the external envelope, including sections of the roof finish and gutter linings left timber elements vulnerable to ongoing and/or future decay.

RPT-Figure-39: Rainwater drainage channels were blocked by debris in several areas

RPT-Figure-40: Rooted plant growth was noted within masonry and through gutter linings

- Doors onto the external roof area had entirely detached at the time of survey due to rusted fixings and decayed framing.

RPT-Figure-41: Failure of the roof access hatch doors left interiors vulnerable to water penetration

RPT-Figure-42: Roof access hatch doors had completely detached by the time of survey

- Localised dampness was detected to several areas of the ceiling finish beneath the east and west roof voids, indicative of historical and/or ongoing water penetration.

RPT-Figure-43: Damp affected ceiling finishes were noted beneath both roof voids

RPT-Figure-44: Damp affected ceiling finishes were noted beneath both roof voids

- Timber elements beneath parapet and valley gutters, particularly those embedded in the east and west perimeter walling, were deemed highly vulnerable to future decay

3A RECOMMENDATIONS

No chemical remedial treatments, insecticides or fungicides are required or recommended.

- *Timber repair: Provisionally allow for localised repair to decayed timber elements identified in this report. Timber repairs can be undertaken by replacing decayed elements entirely with like for like timber (softwood). Alternatively, decayed sections may be cut back until sound timber is reached and new section timbers of like species, quality and moisture content scarfed into position using non-corrosive fixings. It should be noted that provisional investigation suggested the majority of timber elements comprising the pitched roof structures are suitable for retention/re-use upon refurbishment (materially speaking).*
- *Roof void access: Allow for the installation of roof hatches into the east and west roof voids to allow for inspection, repair and maintenance. It is recommended that this is achieved by going through the non-historic plasterboard ceiling finishes beneath each void rather than forming external hatches through the roof finish.*
- *Further investigation: When access allows or upon future refurbishment works, allow for Six Heritage to return to site to undertake a detailed assessment as to the full condition of the pitched timber roof structure*
- *Roof hatch repair: Further short term allowance should be made for the repair of the roof access point doors which had entirely failed at the time of survey leaving the structure vulnerable to intermittent water penetration resulting in damp and decay*
- *External defects: Allowance should be made for the clearing and inspection of all rainwater goods as soon as possible. Further consideration should be made towards conducting localised repair to roof finishes and gutter linings in the short-term.*
- *Dust and debris: Allow for the removal of all hazardous dust and debris within the roof voids prior to refurbishment works. This should be carried out by personnel that have undergone adequate training and been provided with appropriate PPE. All waste materials should be disposed of in an environmentally friendly manner.*

/ *Ventilation: Upon future refurbishment, allow for the introduction of improved provisions for the ventilation of the roof voids, to increase the flow of 'through' and 'cross' ventilation which will enable trapped moisture to evaporate and elevated humidities to dissipate, preventing the onset of condensation and mould, as well as the infestation of biological decay organisms. Reference should be made to BS5250:2021 for specific information. It is recommended a sheep's wool insulation (or similar) is used between ceiling joists upon any future refurbishment due to its hygroscopic and sustainable nature.*

3B/ TIMBER DECAY MECHANISMS

3B.1 / Wood-boring beetle

A number of localised structural timber elements displayed evidence of historic decay, due to wood-boring insects, namely Common Furniture beetle (*Anobium punctatum*). These instances of decay were seen to generally only affect the sapwood bands and shallow surfaces of affected timbers. It was deemed that the majority of structural elements within the roof void were highly vulnerable to ongoing/future outbreaks due to a lack of adequate through and cross-ventilation.

3B.2 / Fungal organisms

There was limited evidence of active or ongoing decay due to fungal organisms at the time of survey. However, timber elements embedded within damp or potentially damp masonry, particularly to the east and west, with no / limited allowance for ventilation were deemed highly vulnerable to future decay. Localised instances of failed roof finishes at the time of survey had resulted in localised, ongoing wet rot decay to timber elements.

RPT-Figure-45: Evidence of historical and potentially active wood boring beetle was noted

RPT-Figure-46: Wet rot was affecting timber elements in localised instances

3B RECOMMENDATIONS

No chemical remedial treatments, insecticides or fungicides are required or recommended.

No immediate action required. Recommendations made in this report should be followed to best manage risk of ongoing / future decay. Particular attention should be paid towards advice to improve ventilation to voids and to isolate vulnerable timber elements from potentially damp masonry. SH can comment further if instructed

APPENDIX I

Photographic Library

APPENDIX I

HERITAGE ASSESSMENT - LOCATION (EXT) FIG:

1 / Showing a general view of the front east facing elevation

2 / Showing a focused view of the external side of the front parapet wall. Note that no evidence of significant reconstruction was identified at the time of survey

3 / Showing a further focused view of the external side of the front parapet wall. Note that no evidence of significant reconstruction was identified at the time of survey

APPENDIX I

HERITAGE ASSESSMENT - LOCATION (EXT) FIG:

4 / Showing a focused view of a date stamp within a rectangle of cementitious render, located on the front elevation. The date stamp reads "Rugby Estate 1888"

5 / Showing a general view of the glazed pitch roof over the central lightwell. Note that structural elements forming this pitched lightwell roof were deemed to likely be from the mid to late 20th century

6 / Showing a general view of the timber hatch covering, clad with lead and slate

APPENDIX I

HERITAGE ASSESSMENT - LOCATION (EXT) FIG:

7 / Showing a general view of the south face of the west chimneystack. Note that no ghost marks were identified that suggested the roof structure had previously been at a different pitch

8 / Showing a focused view of the lead flashing that was providing waterproofing to the roof structure, at the interface with the chimneystack

9 / Showing a general view of the south parapet wall of the neighbouring property. Note that this appeared to have been built in the second half of the 20th century

APPENDIX I

HERITAGE ASSESSMENT - LOCATION (INT) FIG:

10 / Showing a main beam within the west roof void that displayed evidence of hewn conversion, that was likely original to the initial construction. on the left are several timber plates, joists and beams which appear to be from a later period

11 / Showing a general view of the structural arrangement, which was the same in both roof voids

12 / Showing a focused view of the vertical face of a common rafter within the west roof void, that displayed the remnants of bracker's marks. The method of inscription and the timber species suggested that the provenance of this element was likely from the mid 19th century

APPENDIX I

HERITAGE ASSESSMENT - LOCATION (INT) FIG:

13 / Showing a common rafter within the east pitch of the west roof structure that displayed conversion marks that appeared to have likely been created using mechanized cutting equipment

14 / Showing a series of ceiling joists within the east roof void that displayed surface conditions such as areas of cleaving and possibly hewing that suggested they were likely from an earlier phase of construction than other structural elements, such as some of the common rafters

15 / Showing a general view of the structural arrangement of timbers forming the apex of the east roof structure

APPENDIX I

HERITAGE ASSESSMENT - LOCATION (INT) FIG:

16 / Showing a focused view of a the vertical face of a common rafter within the east pitch of the west roof structure. Note that further evidence of Bracker's marks were identified to one of the common rafters, again suggesting that the provenance of this element was likely from the mid 19th century

17 / Showing 2 no. beams located within the west void. Note the presence of a joist beam with redundant mortises, which suggests the ceiling structures may have been altered, or that this element had been repurposed from a previous structure. Also note that the colouring (which contrasted significantly from the beam above) suggested it had been finished using creosote

18 / Showing a focused view of the hip-end rafter plate forming the rear void. Note that the birdsmouth joint of the right common rafter was within an oversized housing and the left common rafter foot was secured using a mitred butt joint or "seat cut". Additionally, the beam below

APPENDIX I

HERITAGE ASSESSMENT - LOCATION (INT) FIG:

19 / Showing a further example of differing section sizes and jointing methods used to secure the feet of common rafters to the plate, possibly indicating different phases of construction/ refurbishment

20 / Showing the underside of a common rafter. Note that this was untreated and the surface condition suggested that it was possibly from a later phase of construction/ refurbishment

21 / Showing a bearing end of a trimmer joist forming the access hatch to the external roof area. Note the trimmer joist had been secured using wire nails, which were not developed until approximately the mid to late 19th century

APPENDIX I

HERITAGE ASSESSMENT - LOCATION (INT) FIG:

22 / Showing a redundant mortise in a ceiling joist plate that had been removed to allow for the access hatch to the roof. This further indicated that the access hatch and covering structure were of later construction

23 / Showing the lap-jointed bearing end of a joist within the roof hatch area. This joint had been secured using wire nails and the surface condition of the timber suggested a later provenance. These had likely been installed at a later date to support the water tank

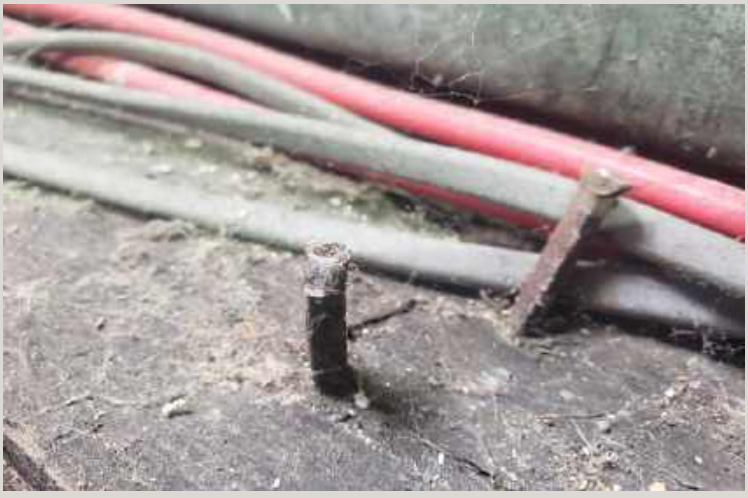
24 / Showing a general view within the void between roof structures, looking north. Note the presence of a later beam (visible on the right) that featured mechanical conversion marks suggesting significant works were undertaken after initial construction, likely to install the lantern

APPENDIX I

HERITAGE ASSESSMENT - LOCATION (INT) FIG:

25 / Showing the presence of contemporary galvanized sheet metal forming the external trench guttering, as well as expanding metal lath and mastic sealant

26 / Showing cistern/water tank within roof access hatch area. Cisterns were installed within roof voids during the Georgian and Victorian eras though predominantly during the 19th century



27 / Showing what appeared to be cut iron nails within the roof access point area upon preliminary investigation, common in the c.19th century

APPENDIX I

CONDITION SURVEY - LOCATION (EXT)

FIG:

28 / Showing general view of lantern to the north. Note localised repair works using tape over ridge and glazing bars

29 / Showing inadequate repair to lantern structure leaving it vulnerable to water penetration. Note localised biological growth to topside of lantern, indicative of chronic damp conditions

30 / Showing soil pipe to the south entirely embedded in party wall. Note, this may have compromised effectiveness of pipe and prevented access for inspection

APPENDIX I

CONDITION SURVEY - LOCATION (EXT)

FIG:

31 / Showing example of blocked parapet gutter due to biological growth

32 / Showing example of contemporary external finishes such as leadwork and cementitious render in western parapet

33 / Showing widespread blockages to southern parapet gutter due to biological growth

APPENDIX I

CONDITION SURVEY - LOCATION (EXT)

FIG:

34 / Showing single rainwater outlet to the south which was deemed highly vulnerable to blockage

35 / Showing general view looking north

36 / Showing localised biological growth to valley gutter, indicative of chronic damp conditions

APPENDIX I

CONDITION SURVEY - LOCATION (EXT)

FIG:

37 / Showing further examples of blocked parapet gutter leaving structure below vulnerable to damp and decay

38 / Showing generally clear parapet gutter to the east, though localised cracks/ failure in gutter lining were noted

39 / Showing rooted plant growth to the north-east of the roof-scape, indicative of chronic damp conditions

APPENDIX I

CONDITION SURVEY - EAST PITCH

FIG:

40 / Showing widespread damp staining to timber elements beneath the eastern parapet gutter

41 / Showing localised wet rot decay to high level rafter to the southern pitch

42 / Showing debris present within roof void to the topside of the ceiling finish

APPENDIX I

CONDITION SURVEY - EAST PITCH

FIG:

43 / Showing general view looking north, note localised re-pointing to brickwork comprising chimney-stack

44 / Showing widespread damp staining to rafter feet, rafter plate and parapet gutter joists to the east

45 / Showing widespread damp staining to rafter feet, rafter plate and parapet gutter joists to the east

APPENDIX I

CONDITION SURVEY - EAST PITCH

FIG:

46 / Showing valley gutter plate/inner pitches apparently in reasonable condition upon preliminary inspection

47 / Showing general view looking up at rafters, note underlay only present to west pitch of eastern roof structure

48 / Showing general view towards ridge, note rafters in reasonable condition upon visual inspection

APPENDIX I

CONDITION SURVEY - WEST PITCH

FIG:

49 / Showing evidence of damp staining to timber elements to the north-west

50 / Showing no underlay present to inner pitch of roof void as was the case to the east

51 / Showing general view, note evidence of re-pointing to brickwork within northern chimney-stack

APPENDIX I

CONDITION SURVEY - WEST PITCH

FIG:

52 / Showing no visible ventilation comprising ridge or opposing pitches

53 / Showing debris present to topside of ceiling structure at time of survey

54 / Showing example of interstitial mould growth as a result of intermittent water penetration and a lack of adequate through and cross ventilation of void

APPENDIX I

CONDITION SURVEY - TILE ACCESS

FIG:

55 / Showing example of tiled roof finish lifted to allow for visual and videoscope investigation of roof void

56 / Showing example of roof finishes returned to original state following investigation

APPENDIX I

THERMOGRAPHY

FIG: 57 / Showing both real-light and thermographic image taken from the south-east top-floor for comparative/contextual purposes. Note colder surface temperature was detected towards to high level masonry/interior finishes, indicative of damp conditions

FIG: 58 / Showing both real-light and thermographic image taken from the south-west top-floor for comparative/contextual purposes. Note colder surface temperature was detected towards to high level masonry/interior finishes, indicative of damp conditions

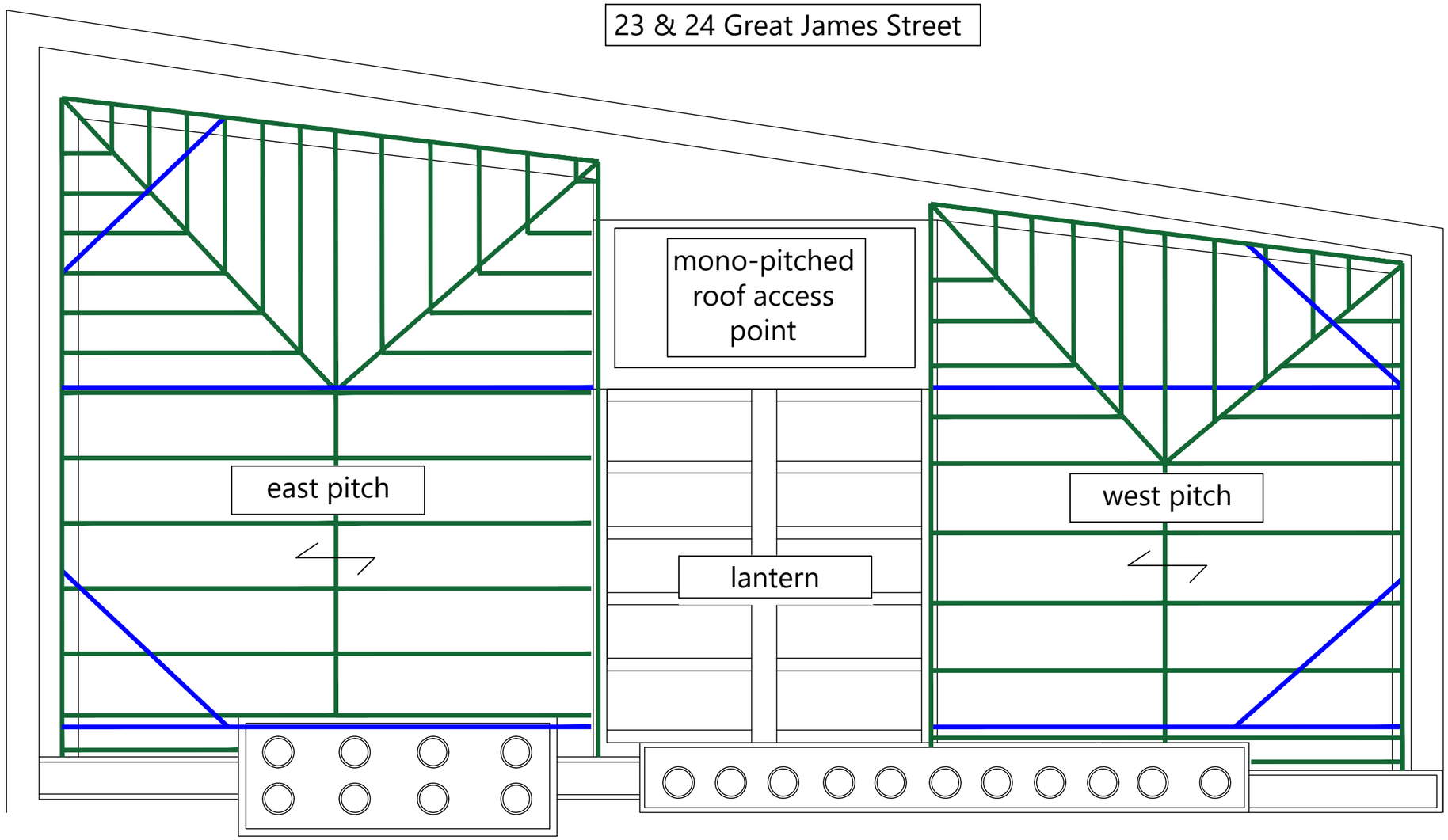
APPENDIX II

Drawing Library

Orientation:

N

23 & 24 Great James Street



21 Great James Street

Drawing key:

▬	Timber rafter, plate, hip, ridge beam
▬	Corner (dragon) tie, primary perpendicular beams
⇜⇝	Ceiling joist direction

six heritage

-- Not to scale --

Six Heritage Ltd,
Austen House,
2 High Street,
Bookham,
Surrey
KT23 4AG

t: 01737570000
e: enquiries@sixheritage.co.uk

www.sixheritage.co.uk

Client:

Owen Design Studios

Project Name:

22 Great James Street

Location:

22 Great James Street,
London WC1N 3ES

Drawing Title:
Structural arrangement of roof structure (Plan view)

Status:
Ready for issue

SH Job ID:
SH - 1024 - 01

Scale:
-- Not to scale --

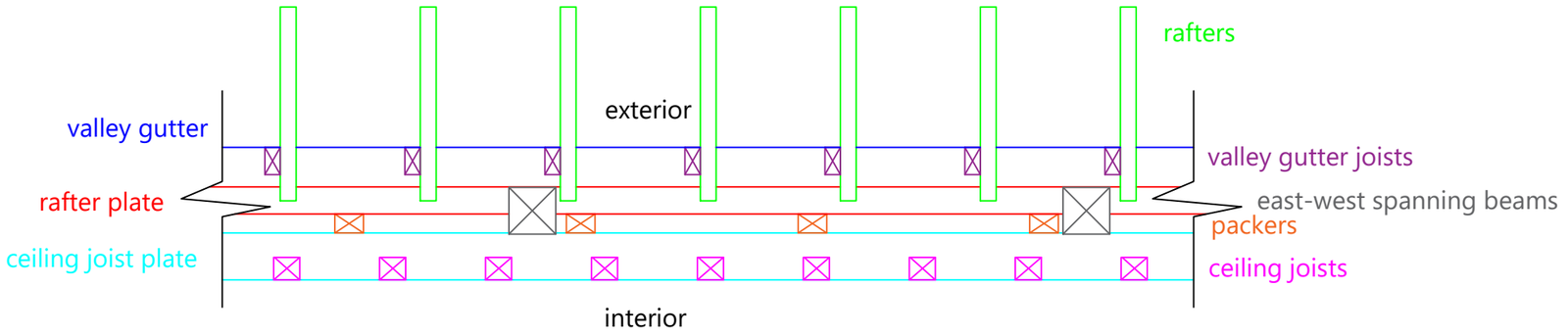
Sheet Size:
A3

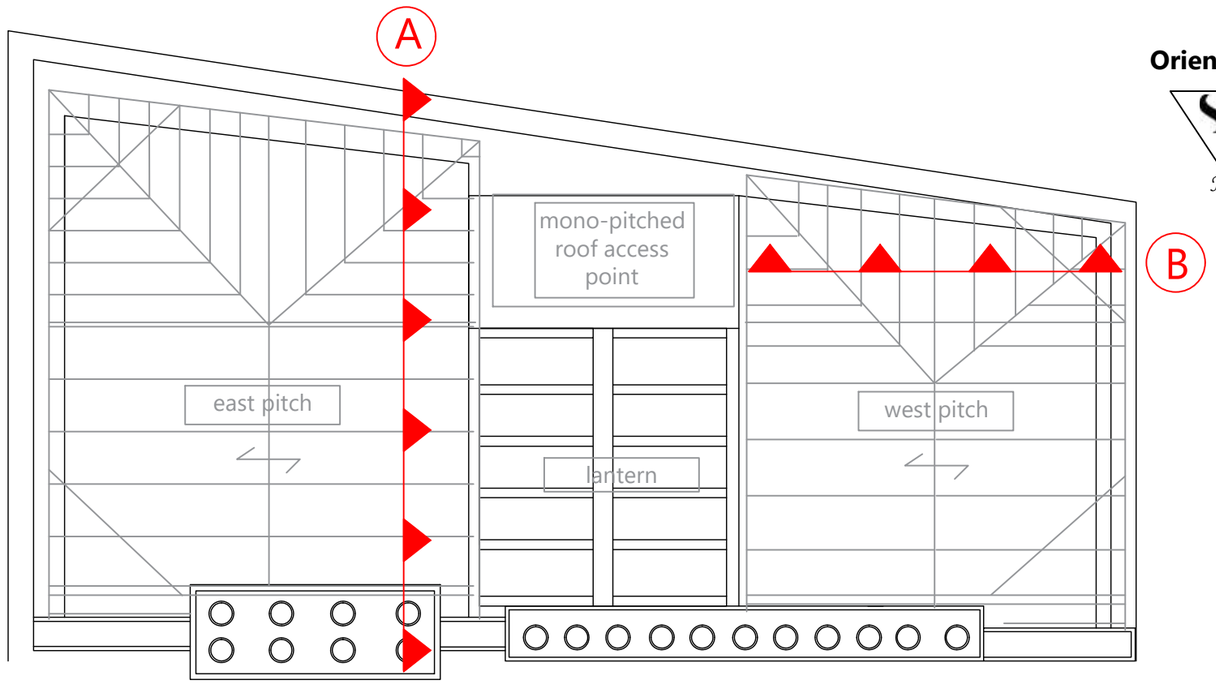
Date:
02-10-2024

Revision:
-

Drawn by:
MLA

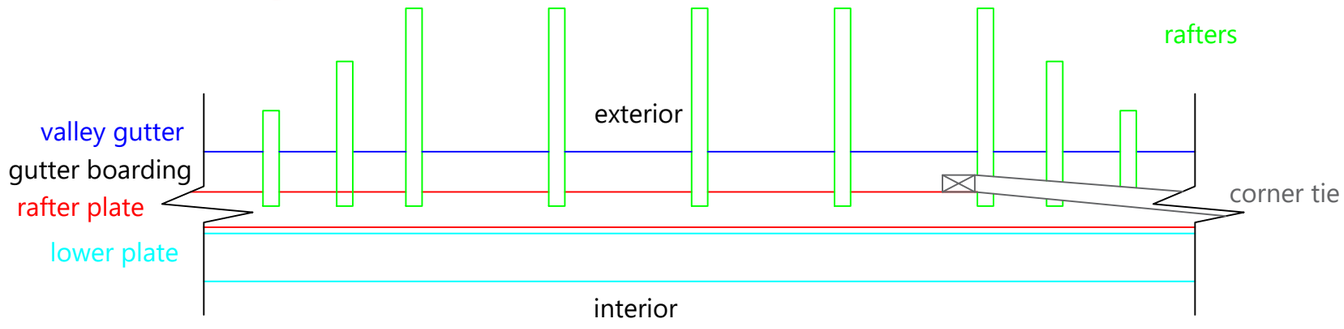
A Arrangement of inner pitch plates /roof structure (illustrative)





Orientation:

B Arrangement of southern hipped pitches (illustrative)



six heritage

Six Heritage Ltd,
Austen House,
2 High Street,
Bookham,
Surrey
KT23 4AG

t: 01737570000
e: enquiries@sixheritage.co.uk

www.sixheritage.co.uk

Client:

Owen Design Studios

Project Name:

22 Great James Street

Location:

22 Great James Street,
London WC1N 3ES

Drawing Title:
Structural arrangement of roof structure
(Hip and inner plate)

Status:
Ready for issue

SH Job ID:
SH - 1024 - 01

Scale:
-- Not to scale --

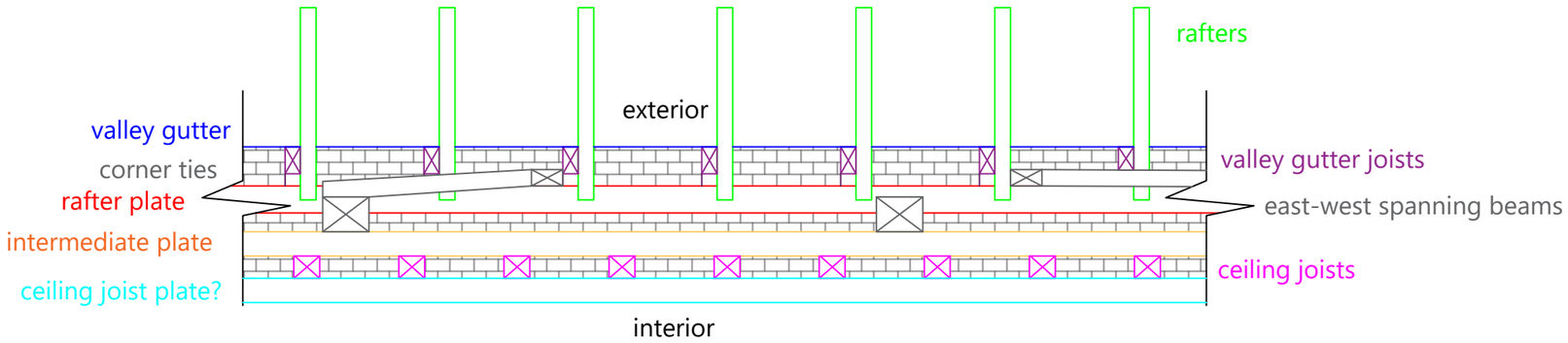
Sheet Size:
A3

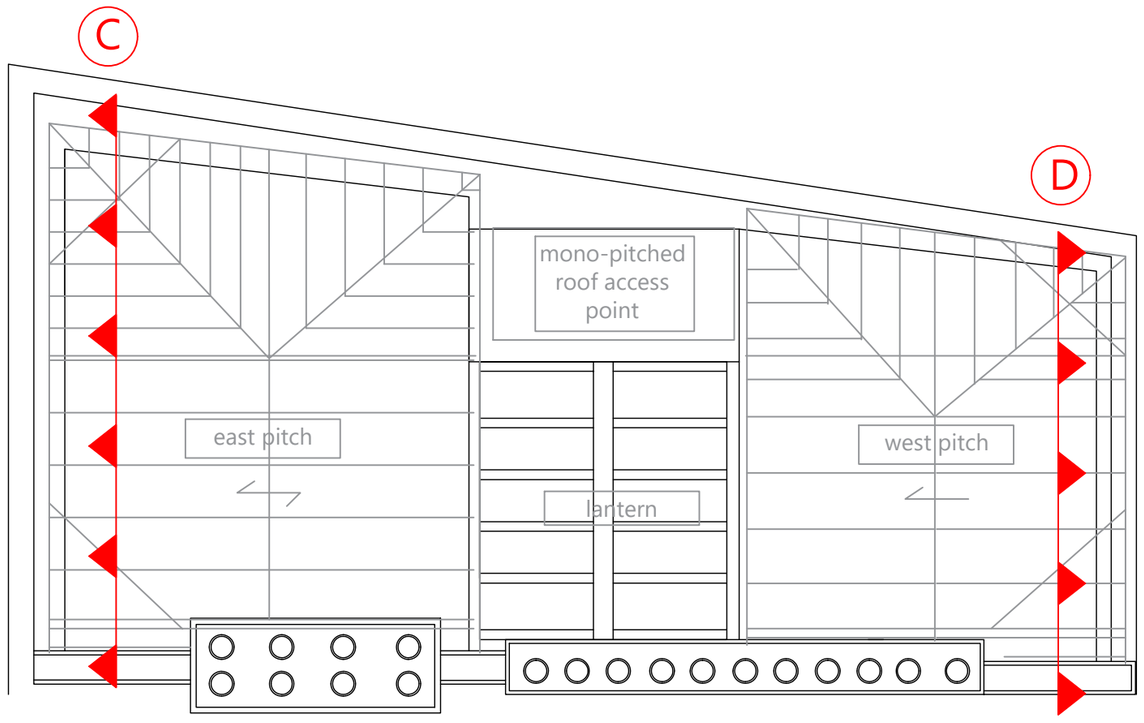
Date:
02-10-2024

Revision:
-

Drawn by:
MLA

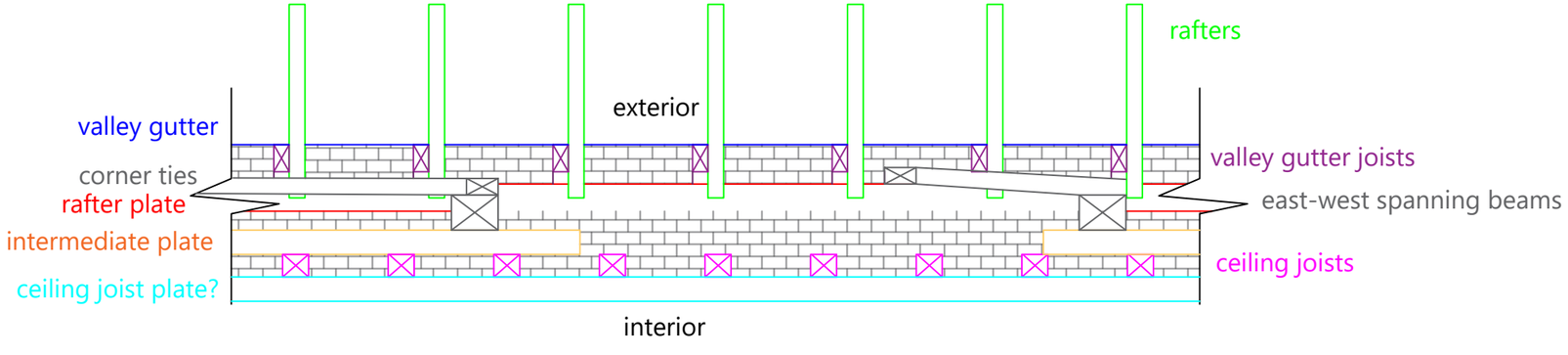
C Arrangement of eastern outer pitch plates /roof structure (illustrative)





Orientation:

D Arrangement of western outer pitch plates /roof structure (illustrative)



six heritage

Six Heritage Ltd,
Austen House,
2 High Street,
Bookham,
Surrey
KT23 4AG

t: 01737570000
e: enquiries@sixheritage.co.uk

www.sixheritage.co.uk

Client:

Owen Design Studios

Project Name:

22 Great James Street

Location:

22 Great James Street,
London WC1N 3ES

Drawing Title:
Structural arrangement of roof structure (Parapets)

Status:
Ready for issue

SH Job ID:
SH - 1024 - 01

Scale:
-- Not to scale --

Sheet Size:
A3

Date:
02-10-2024

Revision:
-

Drawn by:
MLA

Orientation:

N

decay provisionally identified to ~2m of rafter plate and ~6no. rafter feet and parapet gutter joists

visible wet rot decay to ~500mm of rafter

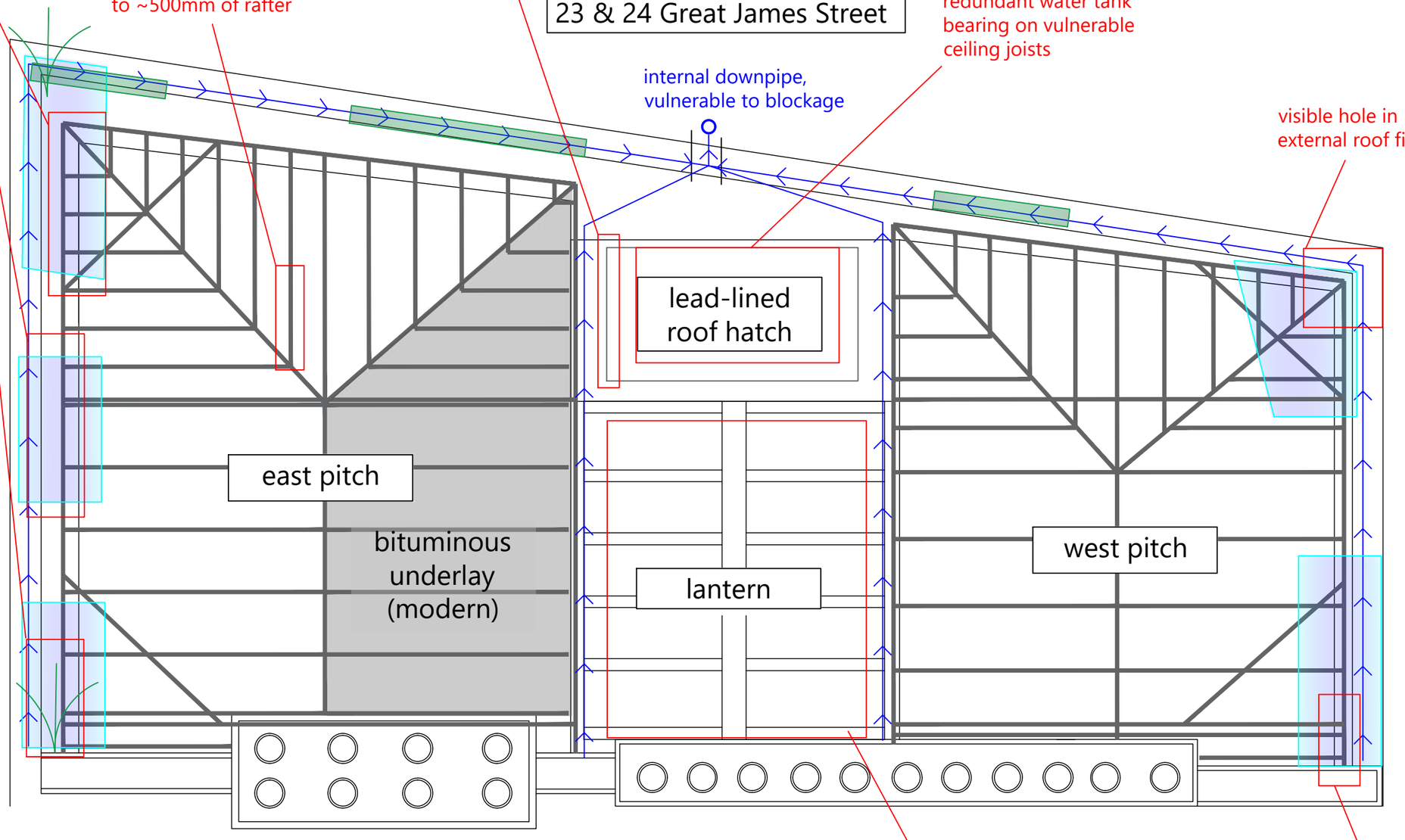
roof hatch doors rotten, detached

23 & 24 Great James Street

internal downpipe, vulnerable to blockage

redundant water tank bearing on vulnerable ceiling joists

visible hole in external roof finish



inadequate patch repairs to lantern seals, vulnerable to water penetration, biological growth in several areas

visible decay to northern bearing of rafter plate for at least ~300mm

21 Great James Street

Drawing key:

	Area subject to damp conditions
	Approximate area of biological growth/blockage to rainwater goods
→	Approximate direction of rainwater drainage
O	Approximate location of rainwater downpipe
	Approximate location of defective element/material
	Rooted plant growth at roof level, indicative of chronic damp conditions

six heritage

Six Heritage Ltd,
Austen House,
2 High Street,
Bookham,
Surrey
KT23 4AG

t: 01737570000
e: enquiries@sixheritage.co.uk

www.sixheritage.co.uk

Client:

Owen Design Studios

Project Name:

22 Great James Street

Location:

22 Great James Street,
London WC1N 3ES

Drawing Title:
Condition, roof structure (Plan view)

Status:
Ready for issue

SH Job ID:
SH - 1024 - 01

Scale:
-- Not to scale --

Sheet Size:
A3

Date:
02-10-2024

Revision:
-

Drawn by:
MLA

Austen House
2 High Street
Great Bookham, KT23 4AG

enquiries@sixheritage.co.uk
+44(0)1737570000

www.sixheritage.co.uk

six heritage