KOKO
Camden, London

Dome:
Historic Timber Structure -
Post-fire Inventory Report

April 2020

Report by:

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With acknowledgements to:

Hutton + Rostron Environmental Investigations Ltd
(Pre-fire dome survey photographs and drawings).

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Post-fire Inventory Report

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Cover image: Dome debris (2020) © SLHA Ltd

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Figure 1: KOKO, Camden. *(2017) © SLHA*

1 INTRODUCTION

1.1 *Objectives*

The following report has been compiled by Stephen Levrant Heritage Architecture Ltd (SLHA), the appointed heritage consultants and conservation architects for KOKO (Grade II listed club/music venue) in Camden, London. The purpose for this report is to provide a record of the timber, which was destroyed by fire in January 2020.

1.2 *Methodology*

The dome was the primary area of the building that was damaged by the fire incident, which occurred on the 06.01.2020. The fire resulted in significant damage and collapse of the timber dome. The copper cladding over the dome deformed and collapsed with the rest of the structure. The dome debris was cleared in mid-February following extensive surveys by the team.

SLHA have carried out a extensive measured and photographic survey of these charred structural timber elements. The survey has been done to investigate the previous construction of the dome, and potentially salvage anything that could be used in the proposed reinstatement. The report contains detailed evidence of the structural elements obtained within the debris; indicating its condition, construction method and materiality. This report has benefited from previous surveys of the dome (before the fire) reported and undertaken by Hutton & Rostron (refer to paragraph 1.5).

In accordance to information provided by Hutton & Rostron Ltd (H&R), SLHA were able to identify key structural elements during the site surveys. Representative examples of every element were recorded and stored on site for reference.

The structure of this report will initially outline a brief history, construction and condition of the dome prior to the fire. The following section will include the detailed recording of the structural elements found in the debris. The final section contains all photographic condition surveys, which has been complied together as the appendix to this report.

An initial site visit was undertaken on 15th January 2020 for a high level assessment. Access to the dome was provided only in mid-February following structural testing of the concrete slab and consequently the surveys were undertaken between 13th to 18th February 2020.

Limitations:
Due to the severity of the fire damage and the upper sections of the dome having suffered significant damage, only limited elements of the apex elements of the dome were discovered. Where it has not been possible to find evidence of charred elements, archival drawings and previous reports have been utilized to fill any gaps in the information

Health & Safety:
All health & safety guidelines and regulations implemented by Od Projects (contractors) were followed as required.

Figure 2: *KOKO Dome condition pre-fire (2018). © SLHA*

1.3 *Local Authority Liaison*

We have been liaising with the local authority (London Borough of Camden) and Historic England (HE) and understand that there is a requirement for a like for like reinstatement of the dome, of identical design, dimensions, materials and details as the fire damaged dome (subject to building control).

The following inventory report comprises of the initial detailed measured drawings and photographic survey that will inform the dome's reinstatement. A subsequent package of drawings at a large scale would show joinery details, dimensions of each element and all other required details for construction purposes. This would be accompanied by conservation specifications.

1.4 *Authorship*

The dome inventory report, including all survey work, has been prepared and carried out by SLHA Ltd, which specialises in the historic cultural environment.

- Stephen Levrant - Principal Architect
- Francesca Cipolla - Practice Director and Architect
- Shantanu Subramaniam - Architectural Conservation Consultant
- John Mullankuzhy - Architectural Conservation Assistant

1.5 *References to other documentations*

This report has been informed by condition reports, photography and drawings of the dome produced and provided by Hutton & Rostron Environmental Investigations Ltd (H&R). It will follow specific terminology and labelling information (i.e. identification of elements) used, which will help outline the construction of the dome.

Following H &R reports used:-

- 146-86 The Hope Project SN5 (28.06.2019) *© H&R*
- 146-89 The Hope Project SN4 (28.06.2019) *© H&R*
- 146-89 The Hope Project SN1 (15.02.2017) *© H&R*

Other referenced documentation include:-

- Heritage Statement (to support Full Application for Planning and LB Consent for KOKO, October 2017) compiled by Author. *© SLHA*
- Historical photographs found at the London Metropolitan Archives (LMA). *© LMA*
- Building plans (2017) from Archer Humphreys Architects. *© AHA*

Please note, all supporting referenced material have been acknowledged within this report.

2. KOKO DOME - SCOPE OF WORKS

2.1 *Statutory information*

Site address:
1A Camden High Street, London, NW1 7JE

Built: 1900
Architect: W.G.R. Sprague

KOKO, originally named Camden Palace Theatre, is a grade II listed building located within the Camden Town Conservation Area, in the London Borough of Camden.

2.2 *Proposal*

The proposal is for the reinstatement of the historic dome which was destroyed by a fire on 6th January 2020. Prior to the fire, the building was undergoing refurbishment lead by Archer Humphreys Architects (AHA) as per the consent received in 2016:-

- *Listed Building No*: 2016/6960/L
- *Planning Reference No*: 2016/6959/P

The dome is consented for use as a private bar as per consented application A new cupola matching to the original design was also consented as part of the aforementioned application.

Stephen Levrant Heritage Architecture (SLHA) undertook a detailed survey of the fire damaged dome in February 2020, the findings of which are included within this report. This report includes a detailed photographic survey of the dome- both before and following the fire, identification of different elements/ components of the dome, their dimensions, details and other specifications. This report will ultimately inform the preparation of detailed construction drawings and specifications for the dome reinstatement.

The survey drawings are being reviewed by the building control consultant, structural engineer and fire engineer for their inputs. The planning drawings for an eventual planning/ listed building consent application will be prepared by Archer Humphreys Architects.

2.3 *Dome Reinstatement Team*

Lead consultants for the dome reinstatement: -

- Stephen Levrant Heritage Architecture Ltd (SLHA),
- Archer Humphreys Architects Ltd (AHA),
- Heyne Tillet Steel Ltd (HTS) &
- Hutton & Rostron Ltd (H&R)

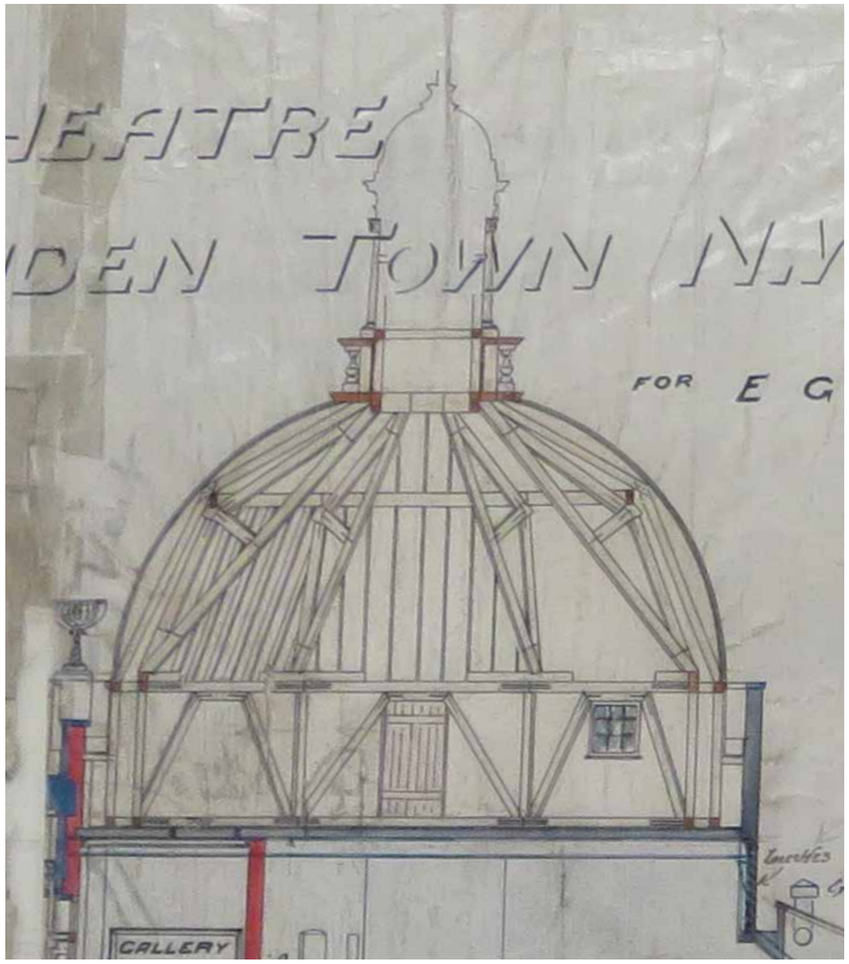

Figure 3: *Archive section drawing of KOKO, Camden by W.G.R. Sprague (1899) © LMA*

2.4 *Dome brief history & pre-fire condition*

The dome is located over the third floor of the building, on the west side facing Camden High Street. It is supported over an RCC slab, which has been tested following the fire and is proposed to be retained. The dome comprises of a timber structure clad externally in copper and reaching approximately 33 meters above street level. Originally the dome had a decorative cupola which was lost at some point in the building's history and it is proposed to be reinstated as part of granted 2016 application.

The dome had several defects before the fire, including previous fire damage (possibly in the early 20th C) and timber decay. The defects have been captured in the survey reports by H&R. The repair works have been carried out as part or current works on site.

Generally, the roof structure maintains its original 1900 construction. Some remedial intervention had taken place in relation to localised repair of fire damaged timber elements, particularly the roof boarding and lower wall boardings. External patching and self adhesive lead tape flashing (Flashband) was used to repair areas of the copper.

Figure 4: *Historic photo of Royal Camden Theatre (KOKO), (1914) © LMA*

Figure 5: *Archive elevation drawing of KOKO, Camden by W.G.R. Sprague (1899) © LMA*

3. DOME CONSTRUCTION - PRE FIRE CONDITION

3.1 *Description of dome construction*

Internal structural elements:
The main timber structure of the dome was constructed by several elements made from European redwood timbers (biological name pinus spp). These elements are as follows: -

A. Main support post
B. Wall studs
C. Doubled timber ribs
D. Lower stud wall plate (D1-inner; D2 - outer)
E. Upper rafter plate (E1 -inner; E2- outer)
F. Roof boarding
G. Main support post braces
H. Wall boarding
I. Apex inner ring beam
J. Apex outer ring beam
K. Apex roof Joist
L. Timber roof rolls
M. Rafter plate wall ties
N. Purlins
T. King-Post Truss

The list above follows SLHA's reference codes (further details in Section 4 - paragraph 4.3). This is an adopted and revised version of a table compiled in H&R's condition report (3.1.2 Table of dimensions - 146-89 The Hope Project SN4 280619).

Internal construction (from base to apex)
Foundations to upper rafter plate (springing point of dome): -
The dome is constructed over clinker concrete roof slab. A timber wall plate (D- lower stud wall plate) was built on the slab, which supports all other timber elements of the dome. These lower stud wall plates are one timber element together but are divided into two segments; an outer semi-circular segment (D2) and an inner rectangular segment (D1). The lower stud wall plate is in the form of an octagon inscribed within a circle. The inner element of the lower wall stud plate (D) provides the octagon form inside the perimeter ring. The semi-circular void, created between the internal edge of perimeter ring and outer face of the inner lower wall stud wall plate (D1), is filled by the outer element of lower stud wall plate (D2).

The main support posts (A) are located to the centre of each side of the octagon formed by the inner element of the lower stud wall plate (D1). These eight main support posts (A) take the load of the timber trusses (T) forming the main structural system of the dome. Each post (A) is strengthened by diagonal braces (G). Likewise, the outer lower stud wall plate (D2) supports the wall studs (B), which support the dome ribs (C) and form a structural framework for the wall boarding (H). The wall studs (B) are linked by a tie.

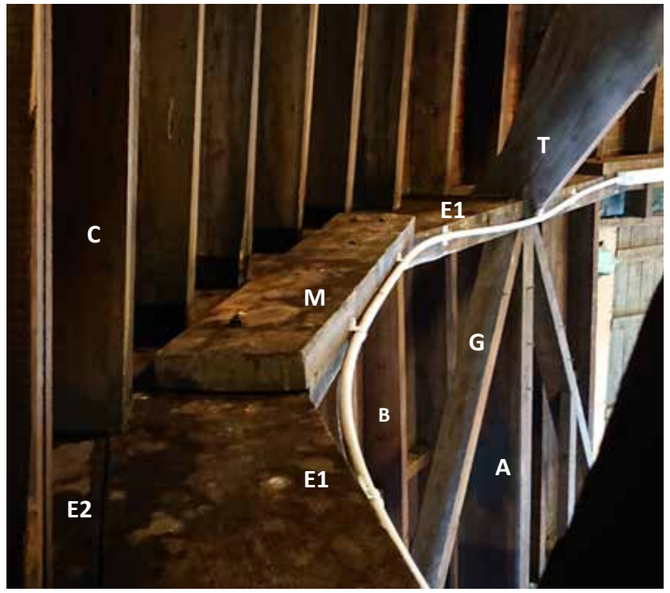

Figure 6: *View from the upper rafter plate, showing rafter wall ties, main support post with braces and truss load on upper rafter plate (2019) © H&R*

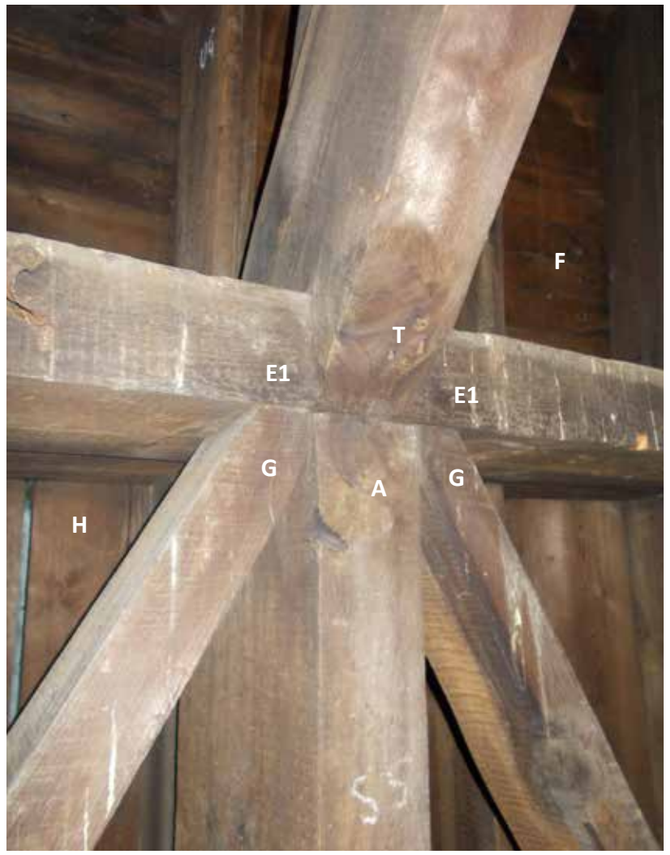

Figure 7: *Birds-mouth joinery detail between outer rafter plate and end of truss. Junction point for main support post with braces and outer rafter plate (2019) © H&R*

Figure 8: *Inside of the dome, showing timber framework construction (2019) © H&R*

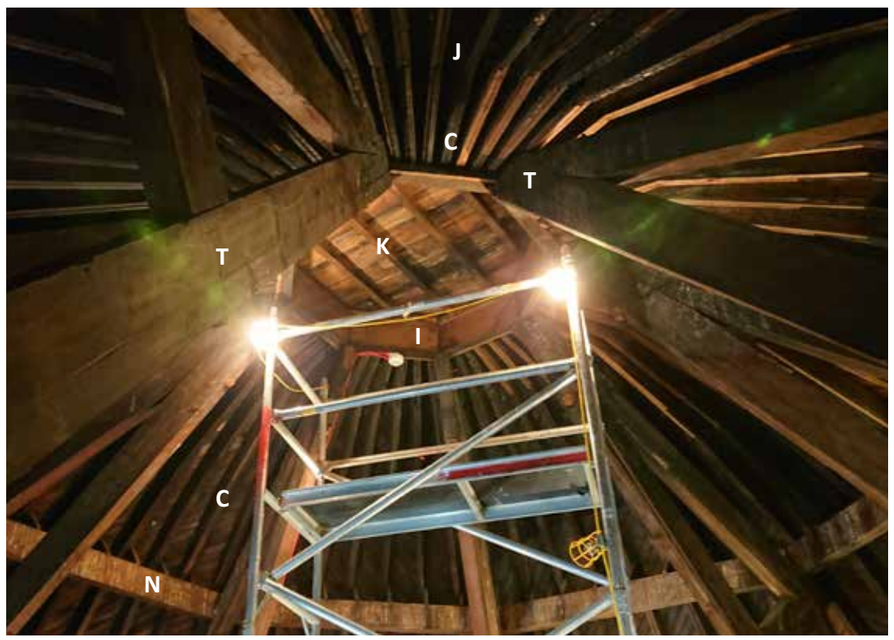

Figure 9: *View of the apex (2019) © H&R*

The upper rafter plates (E) are identical in construction to the lower stud wall plates (D). This element also comprises of inner (E1) and outer elements(E2) and positioned in parallel to the lower wall stud plate (D).

The main support posts (A) and the wall studs (B) are connected to the lower wall studs plate (D) and upper rafter plates (E) by mortise and tenon joints. The main posts (A) (8 nos total) are centred along each side of the octagon while the wall studs are spaced evenly around the perimeter ring, with 9 wall studs (B) between the main support posts (A).

At the eight corners of the octagon formed by the wall and rafter plates are upright wall studs (B) with an additional top and bottom plate. At rafter plate (E) level, the corners are tied together by horizontal rafter wall ties (M).

Top of dome wall (upper rafter plate) to apex: -
Eight king post trusses (T) are supported on the main posts (A). Likewise, timber ribs (C), supported on the wall studs (B) run the entire circumference of the dome. The trusses (T) and ribs (C) are linked by purlins (N). The 2 part ribs (C), doubled timber elements that form the arch of the dome, are located on the domes' intrados from upper rafter plate (D) to the inner apex ring beam (I) and are aligned in position with the wall studs (B). The timber arch is constructed by a series of scarf joints. Closer to the apex, these ribs are held in position by the circular outer apex ring beam (J).

The apex consist of a regular octagonal inner ring beam (I) framing the edge of the trusses (T) and the ribs (C). The junction detail between the end of truss (tie beam) and the inner ring beam (I) is achieved through a birds-mouth joint. The inner ring beam (I) supports roof joists (K) which support the bituminous flat roof covering.

Dome external structure (shell):-
The shell of the dome was constructed by timber boarding (F- roof boarding & H - wall boarding) that covers the dome and wall levels. The timber boarding consists of timber roof rolls (L) that provides the ribbed aesthetic on the exterior of the dome. The timber roof rolls (L) are evenly distributed around the dome's circumference. Each one is arched and follows the curvature of the dome from its apex to base level. The shell is protected and covered by the copper roof cladding. The cladding was designed in a single lock cross welted system and constructed to fit over the top while following the same profile of the shell (2019, H&R).

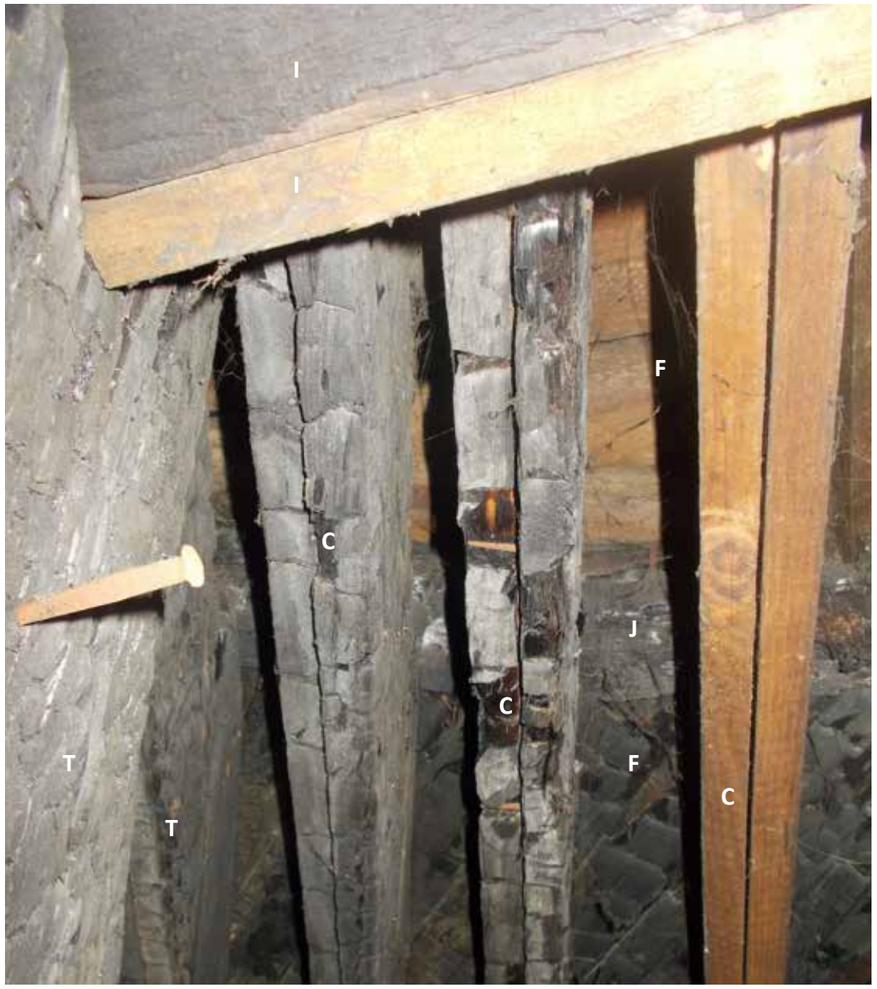

Figure 10: *2-part timber ribs at apex junction & birds-mouth (shown on the left corner) joint from end tie beam of truss. Note previous fire damage (possibly in the early 20th C). (2019) © H&R*

Figure 11: *View of bituminous flat roof covering (previous cupola base location) at apex of dome (2019) © H&R*
(Please note: Annotation (F) is beneath the copper roof sheet)

Figure 12: *View facing down from apex (2019) © H&R*

Figure 13: *Ribs of dome exterior shaped by timber roof rolls (2019) © H&R*
(Please note: Annotation (L) is beneath the copper roof sheet)

Figure 14: *View facing down from apex, showing timber framework construction (2019) © H&R*

Figure 15: *Birds-mouth joint between the truss and inner apex ring beam. Note previous fire damage (possibly in the early 20th C). (2019) © H&R*

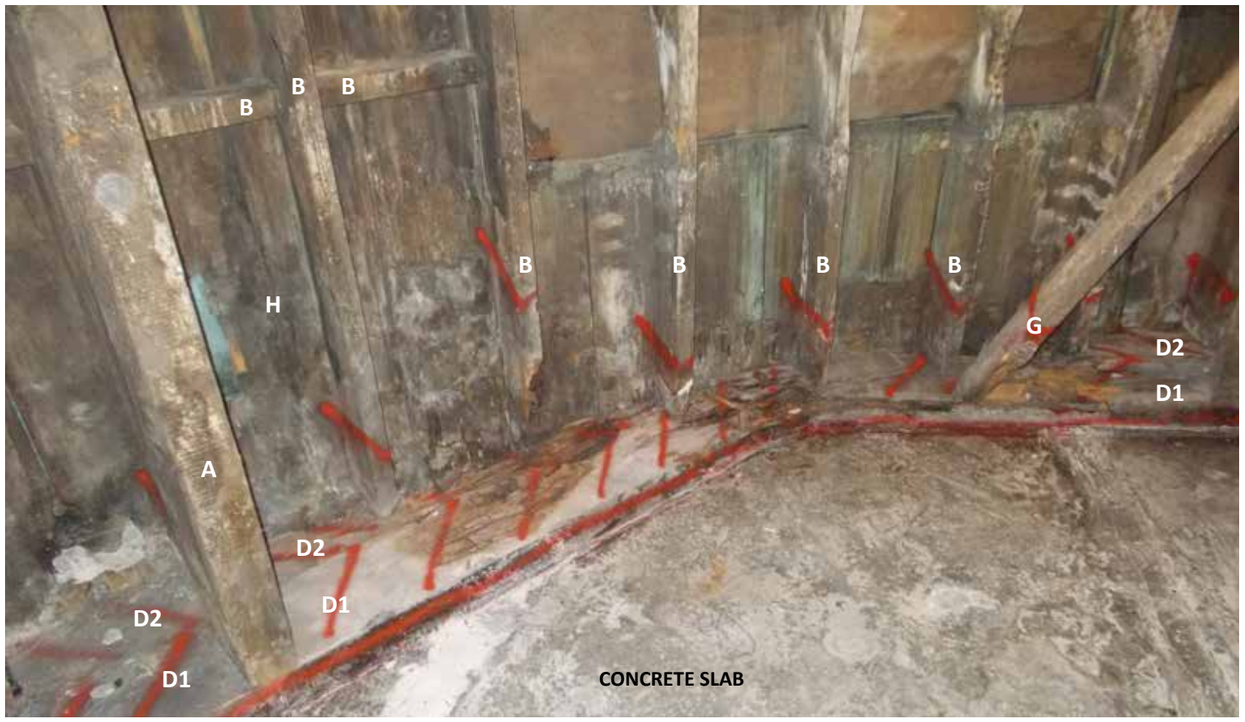

Figure 16: *Lower stud wall plate at the base of the dome. The highlighted red marks are areas of structural timber decay. (2019) © H&R*

Figure 17: *View of junction between the trusses tie beam, 2-part ribs and the inner apex ring beam. Note previous fire damage (possibly in the early 20th C). (2019) © H&R*

Figure 18: *Another view of the tie beam end of truss at the apex (2019) © H&R*

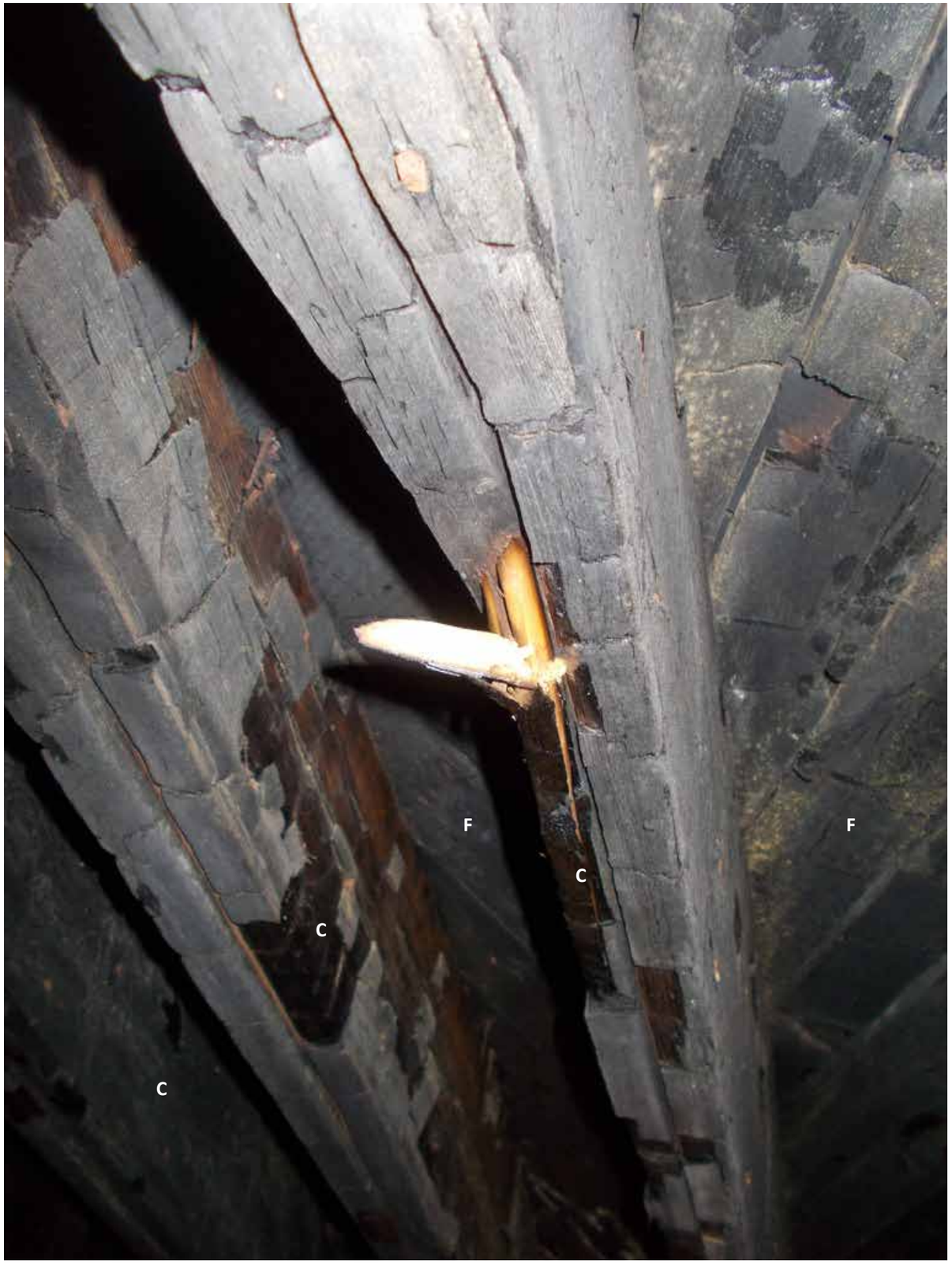

Figure 19: *2- part timber ribs and roof boarding. Note previous fire damage (possibly in the early 20th C). (2019) © H&R*

Figure 20: *Top face view of upper rafter plate (2019) © H&R*

Figure 21: *Bottom view of upper rafter plate. Note previous fire damage (possibly in the early 20th C). (2019) © H&R*

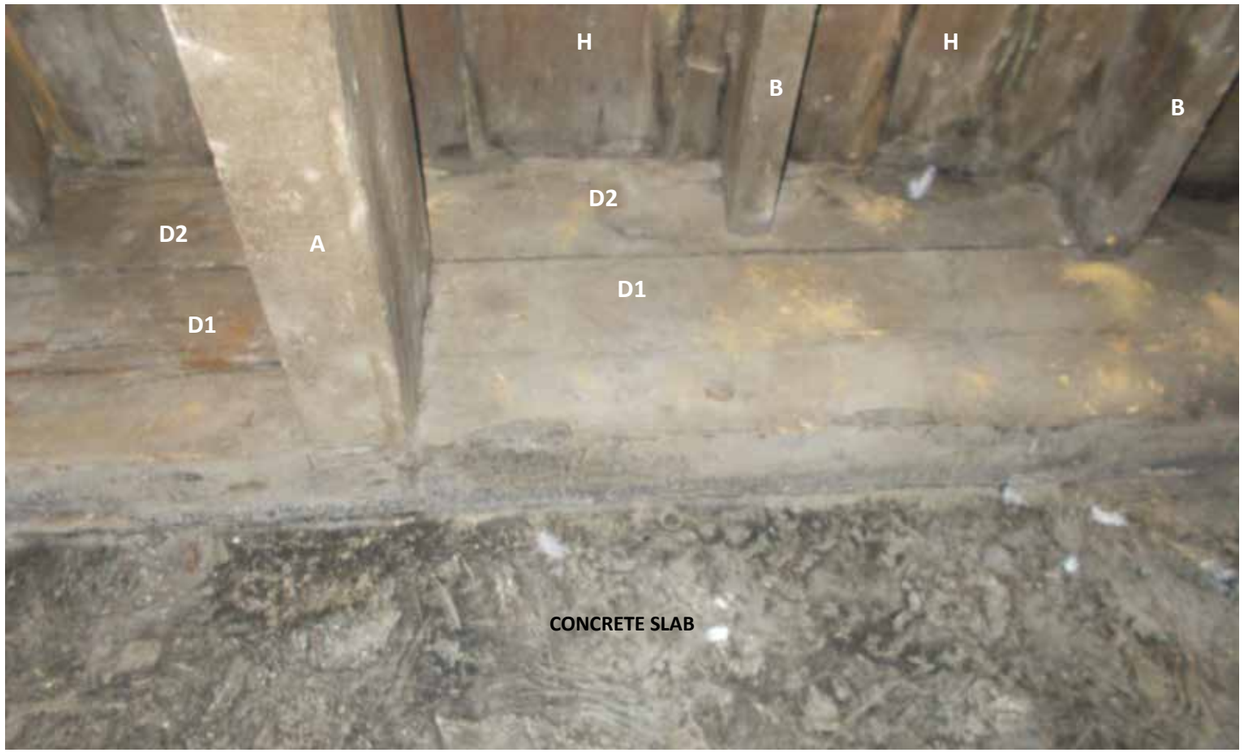

Figure 22: *Lower stud wall plate at the base of dome (2019) © H&R*

Figure 23: *Exterior copper roof cladding and indication of roof boarding beneath the cladding (2019) © H&R*

Figure 24: *Exterior copper rood cladding detail and damage (2019) © H&R*

Figure 25: *Exterior view of dome wall, next to brick pier on NW side of the building (2019) © H&R*

4. INVENTORY REPORT - DEBRIS INVESTIGATION

4.1 *Observations*

An initial site visit was undertaken on 15th January 2020 and high level photographs were taken. In order to access the dome, the crash deck required to be installed and the RCC slab tested. Access to the dome slab was first provided on 13th February 2020 and the copper sheeting was cleared the next day to allow access to the charred timber elements underneath.

Condition survey findings: -

Timber elements identified during survey:

- Truss:
  - King post
  - Tie beam
  - Principal rafters
  - Metal Braces
- Main support post
- Braces to main support posts
- Upper rafter plate (inner & outer)
- Lower stud wall plate (inner & outer)
- Rafter plate wall ties
- Timber roof rolls
- 2-part ribs
- Apex inner ring beam

Elements not identifiable during survey:

- Apex outer ring beam (purlins)
- Apex flat roof joists
- Roof boarding
- Brace supports

Please note:

- The copper roof sheeting was significantly damaged and deformed by the fire.

- The timber elements identified in the debris had suffered severe fire damage and were deemed unfit for reinstatement. However, the bolted metal braces of the truss were salvaged and are proposed to be used in the dome reinstatement.

- Only one representative sample of each element has been salvaged, catalogued and stored. The salvaged elements contained key junctions and construction details which have now been recorded for reinstatement purposes.

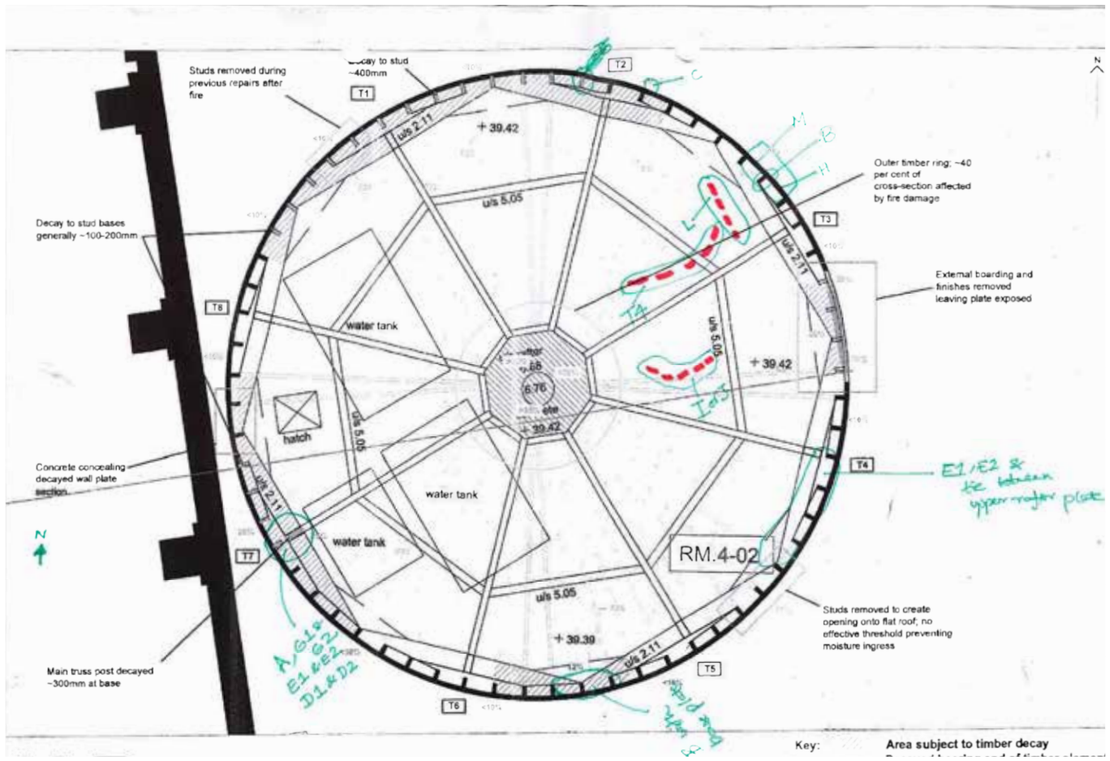

Figure 26: *SLHA survey notes on the location of the structural elements identified (2019) © H&R*

4.2 *List of timber elements*

	Drawing title/ subject	Element	Colour Reference	Cross-section dimension	SLHA's Reference Code
DOME ELEMENTS (detail)					
1	Timber truss	Tie beam		~ 250 x100 mm	T1
		King Post		~ 250 x100 mm	T2
		Principal rafters		~ 250 x100 mm	T3
		Metal braces			T4
		Timber Truss (full)			T
2	Main support posts			~ 250 x100 mm	A
3	Wall studs			~ 155x 50 mm @ 440 centres	B
4	2- Part ribs			~ 170 x 27 mm	C
5	Lower stud wall plate	Inner lower stud wall plate		~ 280 x 110 mm	D1
6		Outer lower stud wall plate		~ 200 x 110 mm	D2
7	Upper rafter plate	Inner upper rafter plate		~ 275 x 110 mm	E1
8		Outer upper rafter plate		~ 205 x 100 mm	E2
9	Roof boarding			~ 80 x 20 mm	F
10	Braces to main support post			~ 125 x 60 mm	G
11	Brace supports			~ 75 x 50 mm	
12	Wall boarding			~ 260 x 18 mm	H
13	Apex ring beam	Inner apex ring beam		~ 350 x 100 mm	I
14	Apex ring beam	Outer apex ring beam		~ 350 x 50 mm	J
15	Apex flat roof joists			4no. ~ 80 x 45 mm	K
16	Timber roof rolls			24no. ~ 100 x 100 mm	L
17	Horizontal wall stud link				M
18	Truss purlin			~ 250 x100 mm	N

Figure 27: *Table of timber elements constructing the dome (2017) © H&R (SLHA revised version)*

4.3 *Element Reference codes*

The following reference codes for each element have been used to describe the elements in the inventory report within the following section.

A. Main support post
B. Wall studs
C. Doubled timber ribs
D. Lower stud wall plate (D1-inner; D2 - outer)
E. Upper rafter plate (E1 -inner; E2- outer)
F. Roof boarding
G. Main support post braces
H. Wall boarding
I. Apex inner ring beam
J. Apex outer ring beam
K. Apex roof Joist
L. Timber roof rolls
M. Rafter plate wall ties
N. Purlins
T. King-Post Truss

4.4 *Methodology for sample documentation*

The above information has been tabulated in Fig. 28. Each element on the table is identified with its alphabetical reference code and its cross section dimensions; and an allocated colour coding has been used in the following sections to identify them.

4.5 *Principal timber elements assigned label and colour in plan*

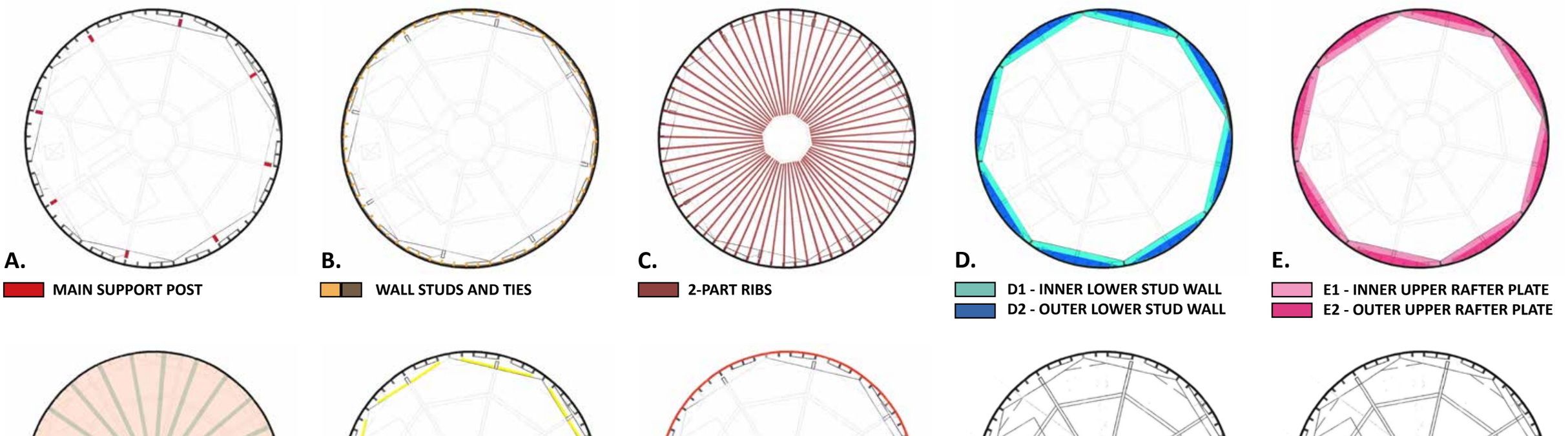

Figure 28: *Letter and colour allocation for each principal elements in plan view. (2019) © H&R (SLHA edit). Each element identified in debris will be further describe in Section 6: Inventory Report - Principal Timber Elements.*

5. INVENTORY REPORT - IDENTIFICATION OF PRINCIPAL TIMBER ELEMENTS

5.1 ***Dome - Copper roof cladding***

Figure 29: *Exterior view of copper cladding on dome roof (2019) © H&R*

Figure 30: *Bituminous flat roof covering at apex (2019) © H&R*

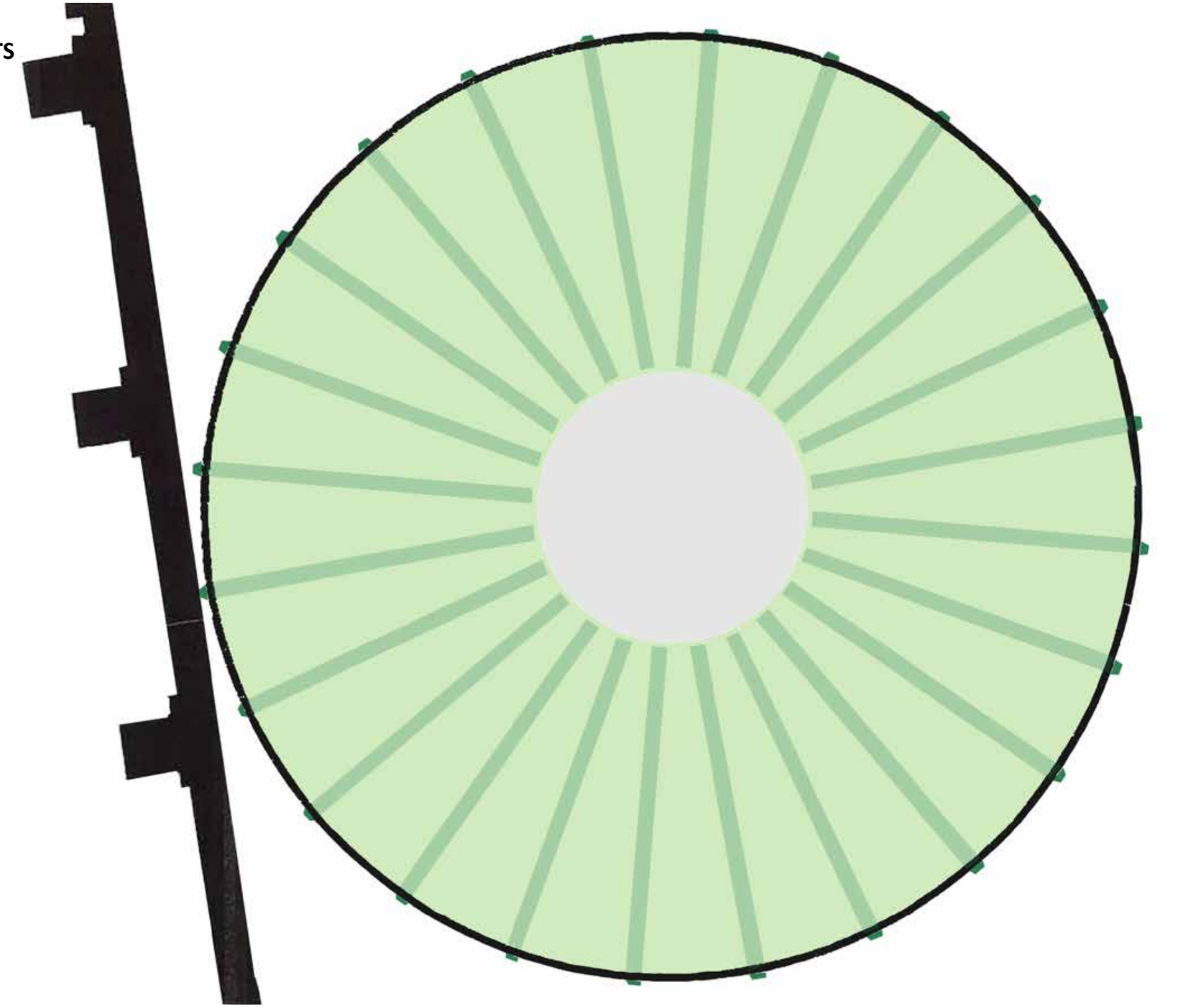

Figure 31: *Dome copper roof cladding in plan view (2019) © H&R (SLHA edit)*

5. INVENTORY REPORT - IDENTIFICATION OF PRINCIPAL TIMBER ELEMENTS

5.2 ***Dome - Timber Shell***

Figure 32: *Interior view of dome and indication of the roof boarding (2019) © H&R*

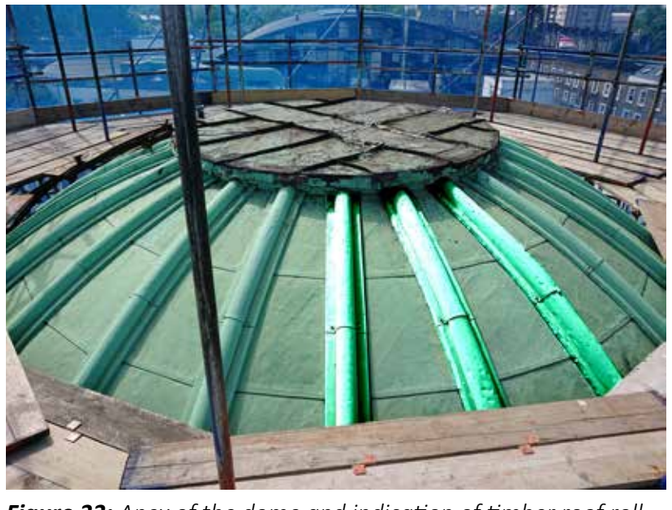

Figure 33: *Apex of the dome and indication of timber roof roll location beneath the copper cladding (2019) © H&R*

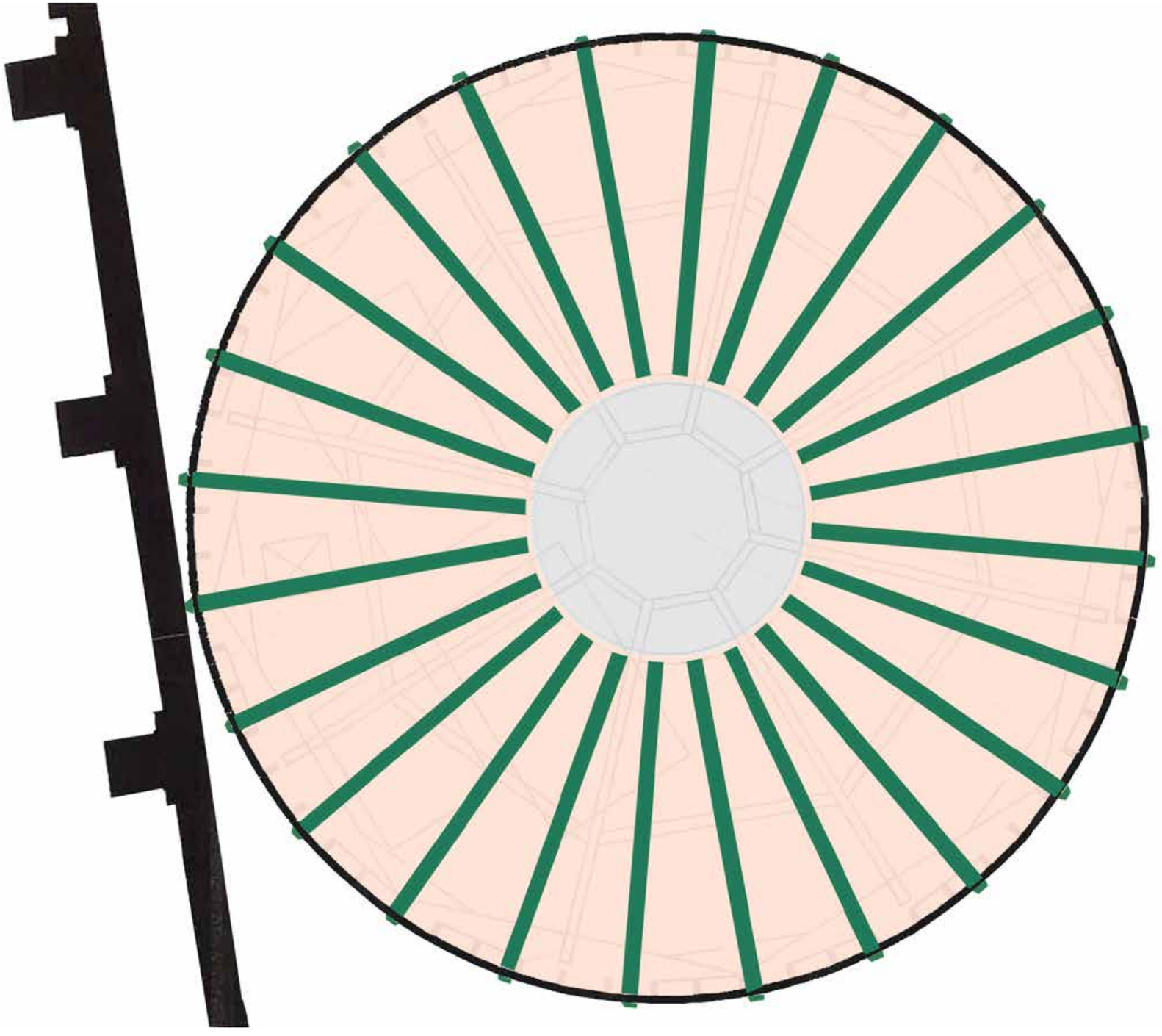

Figure 34: *Dome timber shell in plan view (2019) © H&R (SLHA edit)*

***** *Elements not identified during debris investigation*

5. INVENTORY REPORT - IDENTIFICATION OF PRINCIPAL TIMBER ELEMENTS

5.3 *Dome - Roof Structure*

Section AA: **-**

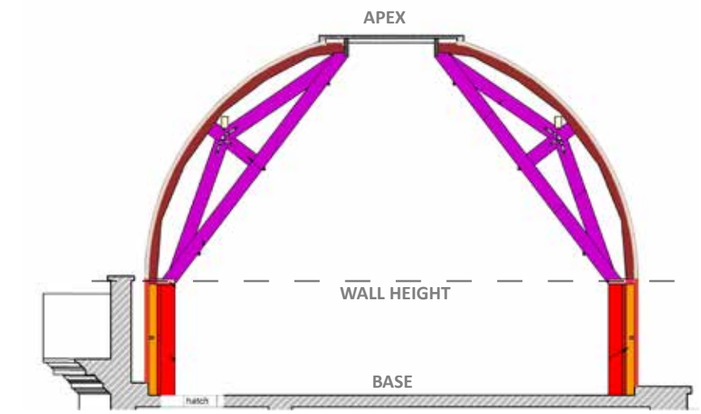

Figure 35: *Section AA of dome (Not to scale) (2019) © H&R (SLHA edit)*

Principle timber elements in-situ: **-**

Figure 36: *Various principle elements (Inner apex ring beam, King post truss, 2-Part ribs and Truss purlins) indicated in situ (2019) © H&R (SLHA edit)*

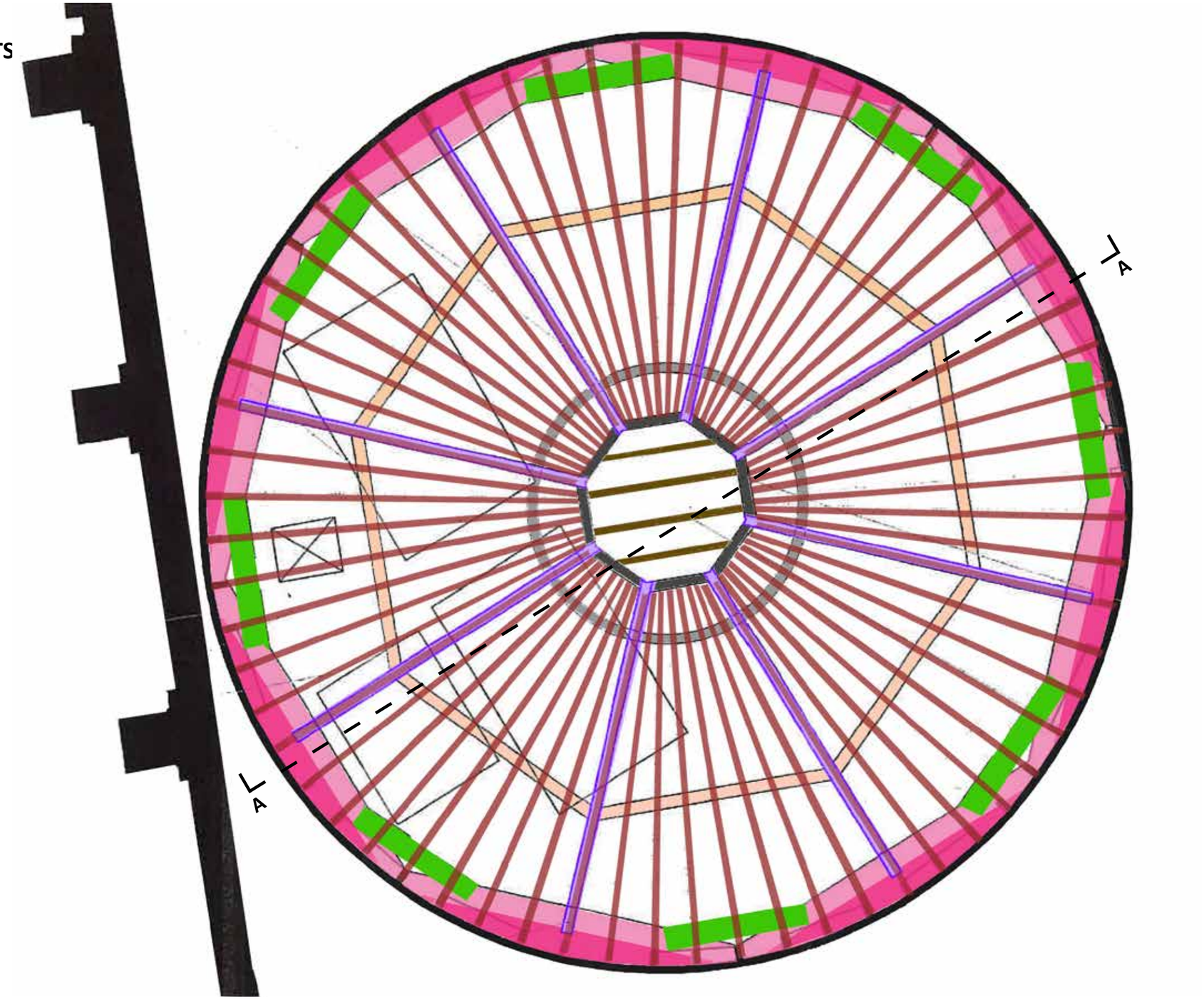

Figure 37: *Dome timber structure in plan view (2019) © H&R (SLHA edit)*

***** *Elements not identified during debris investigation*

5. INVENTORY REPORT -
IDENTIFICATION OF PRINCIPAL TIMBER ELEMENTS

5.4 *Dome - Wall Structure*

Wall elevation (B): -

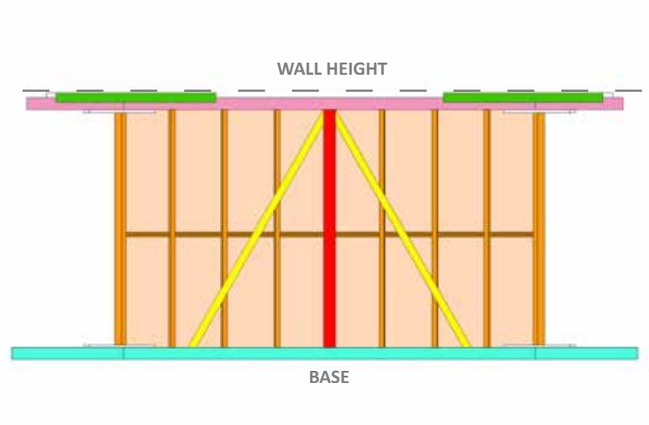

Figure 38: *Elevation of interior wall structure (Not to scale) (2020) © SLHA*

Principle timber elements in situ: -

Figure 39: *Various principle elements (Main support post with braces, upper rafter plate, lower stud wall plate), king post truss and horizontal rafter wall ties) indicated in situ (2019) © H&R (SLHA edit)*

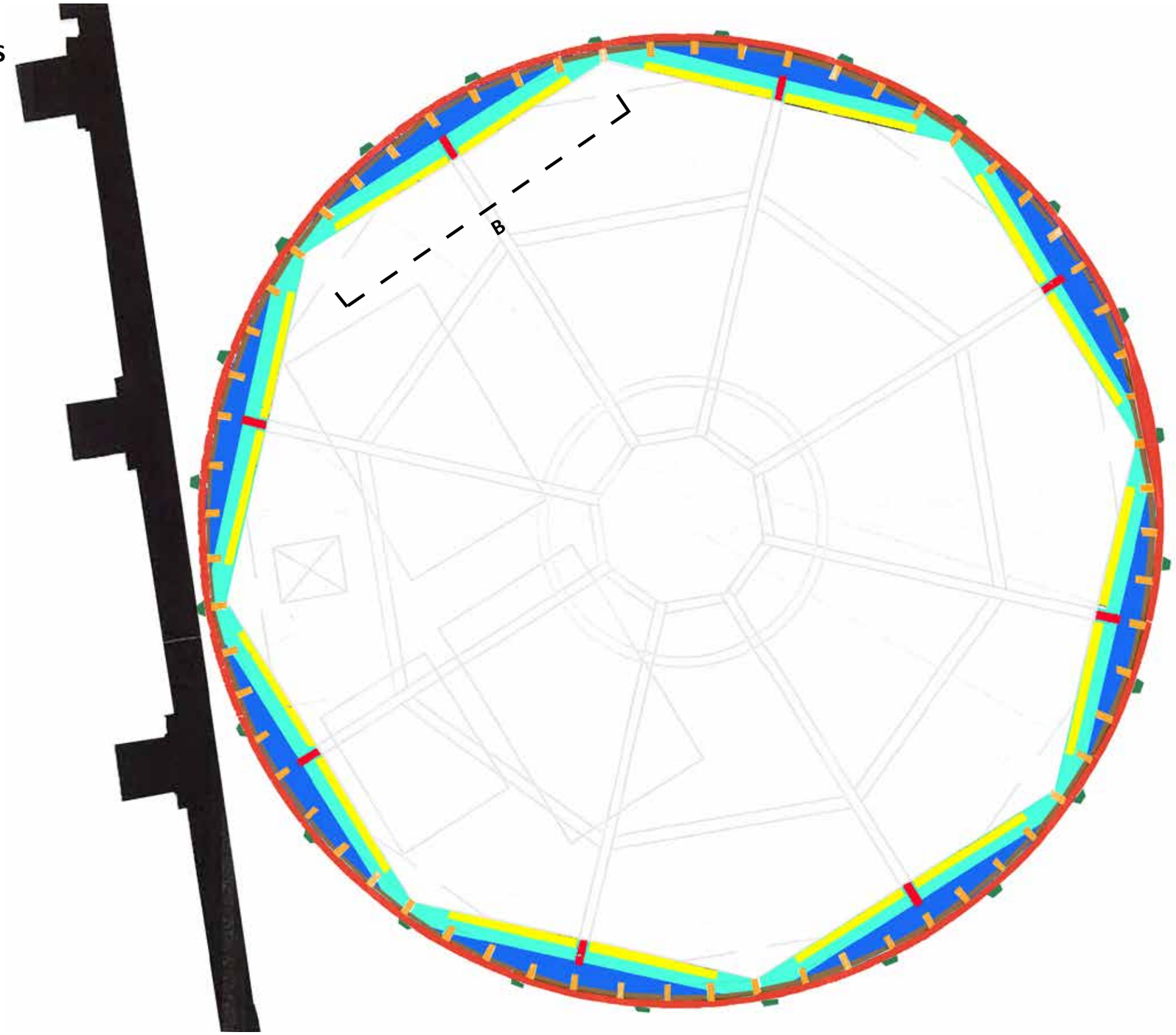

Figure 40: *Dome wall structure below upper rafter plate in plan view (2019) © H&R (SLHA edit)*