

LISTED BUILDING APPLICATION ref PP-12034428 (C1332):
Partial discharge of conditions 3.2 and 4.3
Cupola repairs at Gad’s Hill School, Rochester

clay architecture



Cupola condition discharge

Brief report outlining the process to arrive at the final approach to cupola repairs



Historic photograph showing timber flashing covers

Personnel involved in the discussions:

- CP Camilla Prizeman, Director, Clay Architecture
- KG Kasan Goh, Director, Clay Architecture
- JF James Folley, Structural Engineer, Allan Baxter Partnership
- KP Katherine Parkin, Planner, Gravesham Borough Council
- AC Allan Cox, Conservation Officer, Gravesham Borough Council
- RD Robin Dane, Faversham Joinery
- CP2 Cliff Potter, CAP Construction Ltd, responsible for roof works, removing and re-installing the cupola
- CB Craig Burgin, Operations Manager, Gad's Hill School

Overview

In August 2022, while carrying out condition surveys at the school as part of a wider pre-planning application, JF and CP raise concern over the state of the cupola, particularly the deterioration of the 'feet' of the cupola posts, just above the lead flashing at platform level.

In June 2023, this deterioration had reached a state of greater concern. There were a series of strong storms that year, with more forecast on the way. JF advised that the cupola needed to be removed for repairs to reduce the risk of failure.

Measured survey and drawing up of the cupola was carried out in August 2023; a LBA submitted in early September indicated the issues that were visible: the 'feet' of the posts were rotted above flashing level; more than half the girth of the timber posts rotted away on 2 of the 'feet'; roof twisting anticlockwise on its axis; weathering and deterioration of finishes all over.

Following a meeting between CP, KP and AC on 22/9/2023, and discussions on how to stabilise the structure for removal, the cupola is removed and transported to Faversham Joinery on 4/04/2024. As agreed with AC, the posts were cut at platform level to remove the cupola.

During the opening of the roof, it is discovered that the existing cupola is supported on a more recent base frame, which is itself resting on top of the original historic base frame. The posts were tenoned into the more recent base frame in such a way that it was impossible to remove the posts without cutting the frame. The timbers of the removed base frame are made of pine, surface-planed, machined and repaired. The frame has rectilinear tenons which were tosh-pinned and probably dates to sometime after 1860.

One of the beams of the historic base frame has suffered significant

water damage and is not structurally sound.

On 22/05/2024 CP and KG visit RD at Faversham Joinery to have a closer look at the cupola:

- Besides the weathervane and bell, it is difficult to tell what else of the cupola is original /18thC. Much of it is in poor condition.
- What is clear is that the cupola has been repaired more than once over the years. The plumber's mark on the roofing boards dates the last cupola roof repairs to 1897 (Dickens died in 1870, the house was built in 1779).
- Historic photographs show a timber flashing cover detail that is now missing. The missing flashing cover protected the junction between the top of the lead flashing and the posts. They also appear to show the cupola about half a foot taller than it currently is (the posts may have been shortened in the course of previous repair work). With the top of the flashing exposed and secured with copper nails and gaffer tape, this has made the 'feet' of the posts at platform level more susceptible to damp and rot.
- The roof stalk / finial post is in a poor state. It is severely split in 2 places externally and split in half at the base.
- The weathervane is 60% lead. The metal washer where the weathervane meets the lead cap at the roof stalk is rusted through and the weathervane pivots out of line with its centre-point.
- A combination of water penetration, weakened posts, and the weight of the weathervane pivoting out of its centre-point may account for the poor structural condition of the cupola.

After further discussion— a Teams meeting with KP and AC on 25/6/2024, a Teams meeting with JF on 26/6/2024 and a meeting with JF and RD at Faversham Joinery on 26/7/2024— a solution was agreed involving:

- Reconstructing the timber frame of the cupola, extending the roof stalk / finial post and spindle and introducing a tie beam or strut across the rafters to provide more structural support and restraint for the weathervane
- Lowering the stock of the bell wheel to provide more room for the wheel and to avoid clashes with the new tie beam or strut
- Reintroducing the historic capping detail to cover and protect the lead flashing up the posts.

We have also taken the opportunity to raise the height of the posts by half a foot.

- A site visit was carried out with KG, JF, CP2 and CB on the 29/10/2024 to have a closer look at the damage to the beam of the original historic base frame. The beam is damaged beyond repair and not structurally sound— a new timber beam will be fitted in its place (with joist hangars) before the cupola is reinstalled.

All in all, the final solution is far more conservative and light touch than originally anticipated—at the meeting on 25/6/2024, AC had suggested we look at the option of a concealed steel frame to strengthen the structure).

No steel structure has been proposed in the reconstruction, and the design changes do not outwardly affect the appearance of the cupola.

23/08/2023



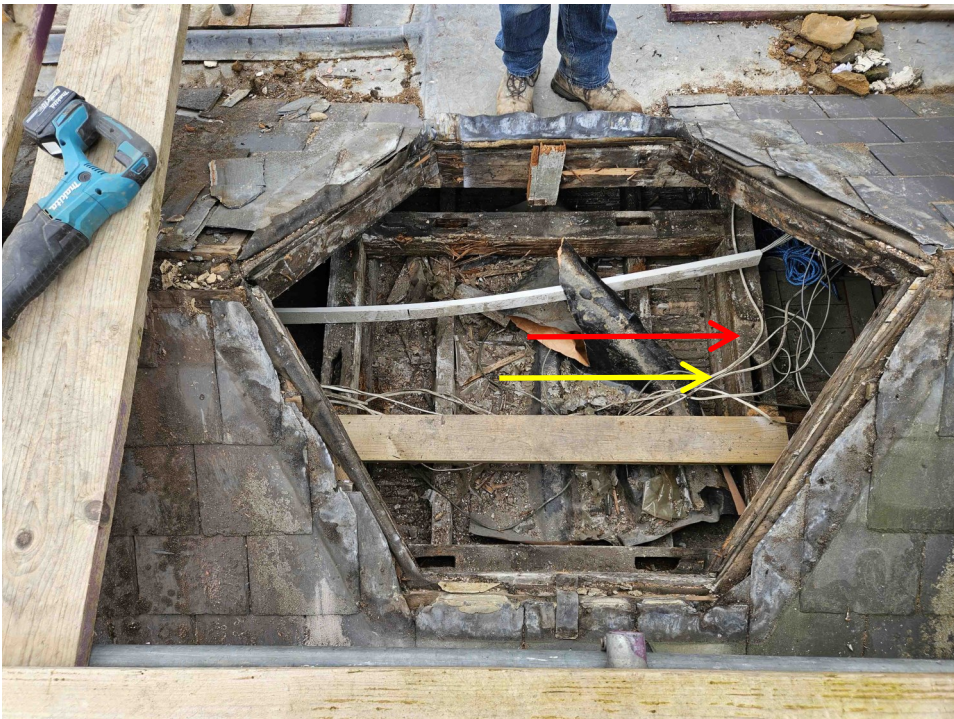
Deterioration on cupola post

2/04/2024



Red arrow: 'Newer' base frame (after 1860) resting on top of
Yellow arrow: original base frame

04/04/2024



With posts removed

4/04/2024



Original base frame showing damaged beam

22/05/2024 (at Faversham Joinery)



Roofing boards with inscription: J Vasler plumbers: Oct 1st 1897

22/05/2024



Sorting through cut frame and post connections



Split in the roof stalk

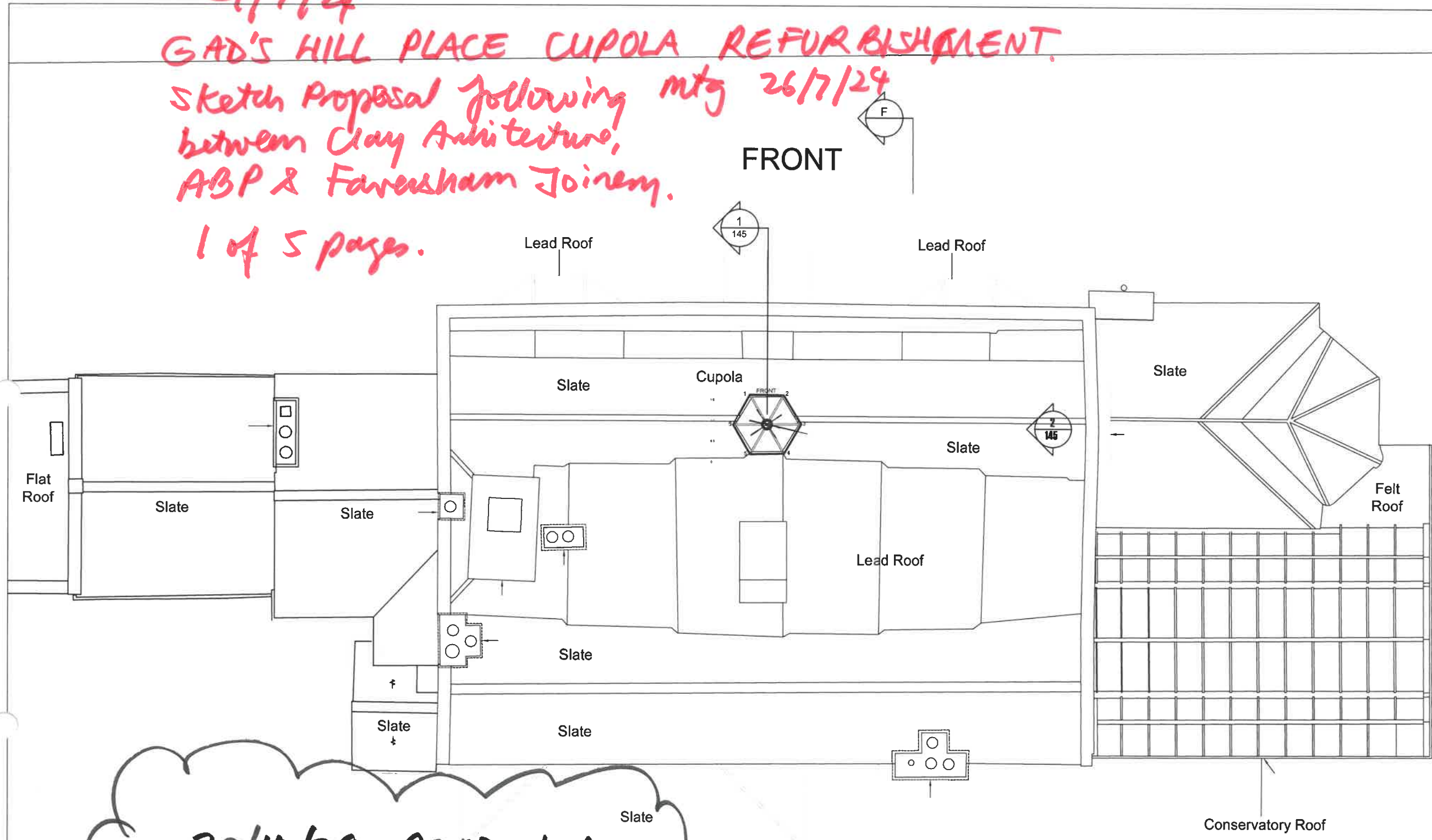


Roof stalk split in half at the base

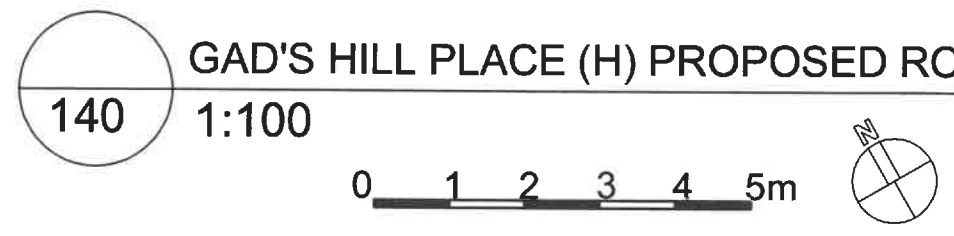


Original base frame resting on ceiling joists

29/7/24
 GAD'S HILL PLACE CUPOLA REFURBISHMENT.
 Sketch Proposal following mtg 26/7/24
 between Clay Architecture,
 ABP & Fareham Joinery.
 1 of 5 pages.

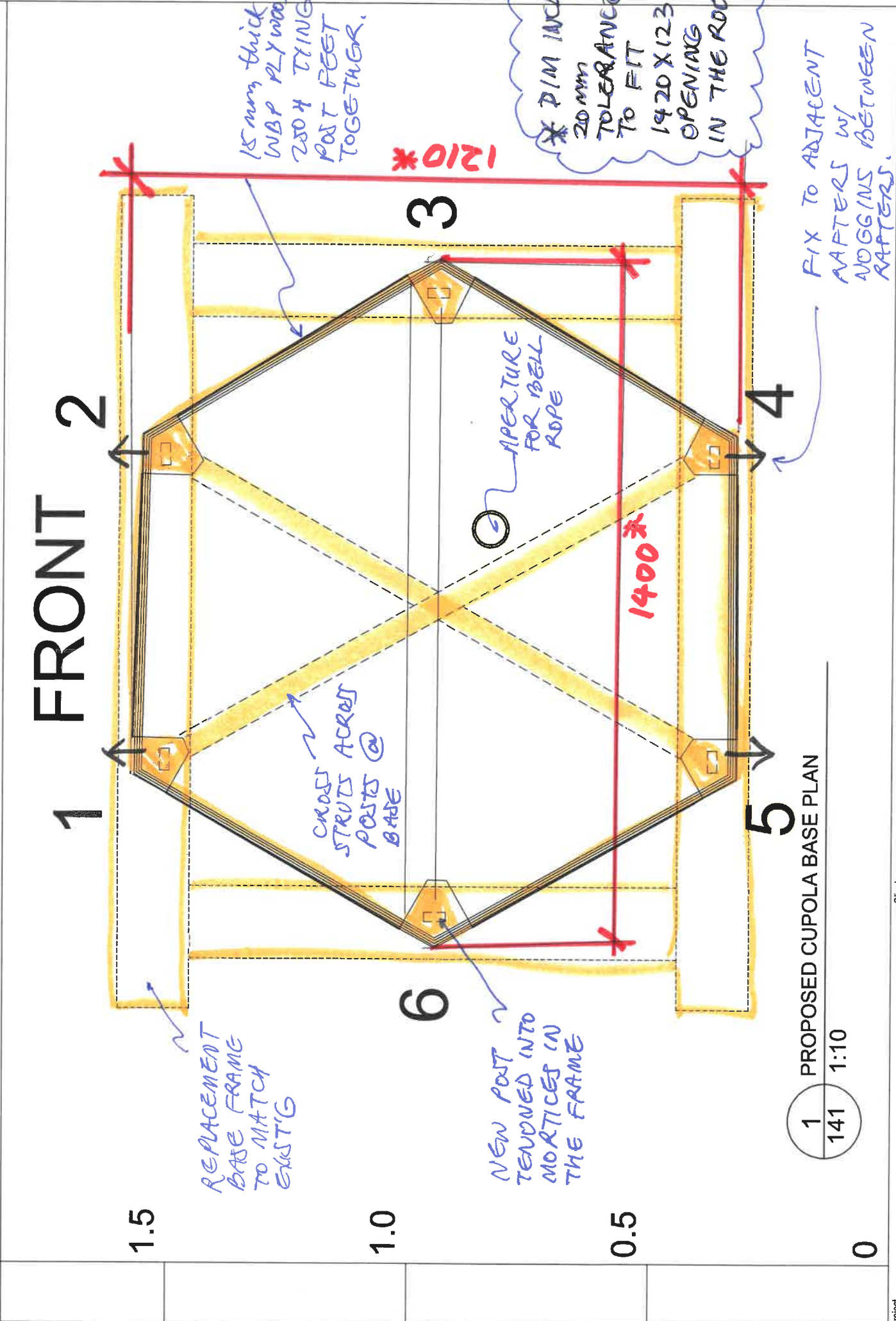
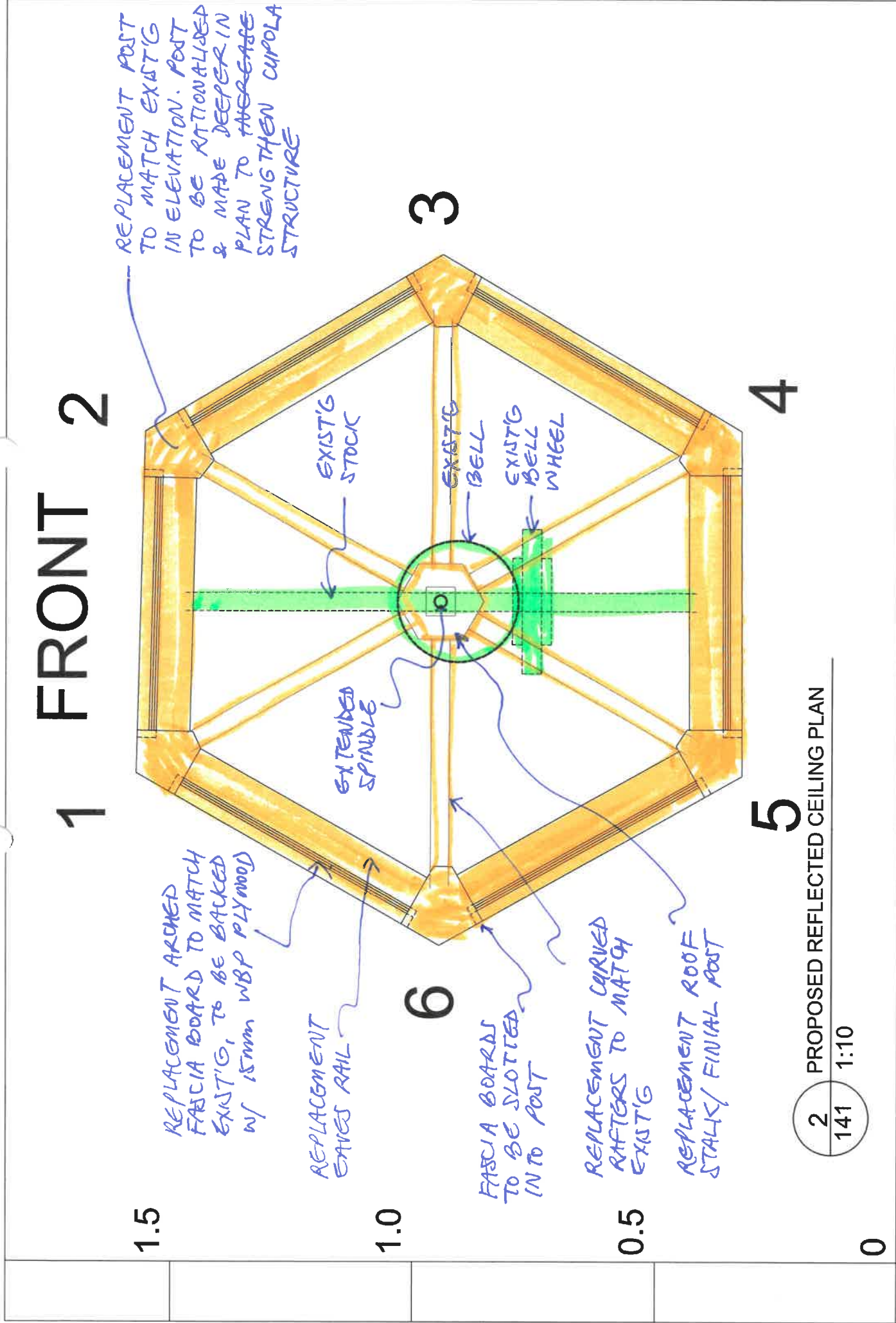


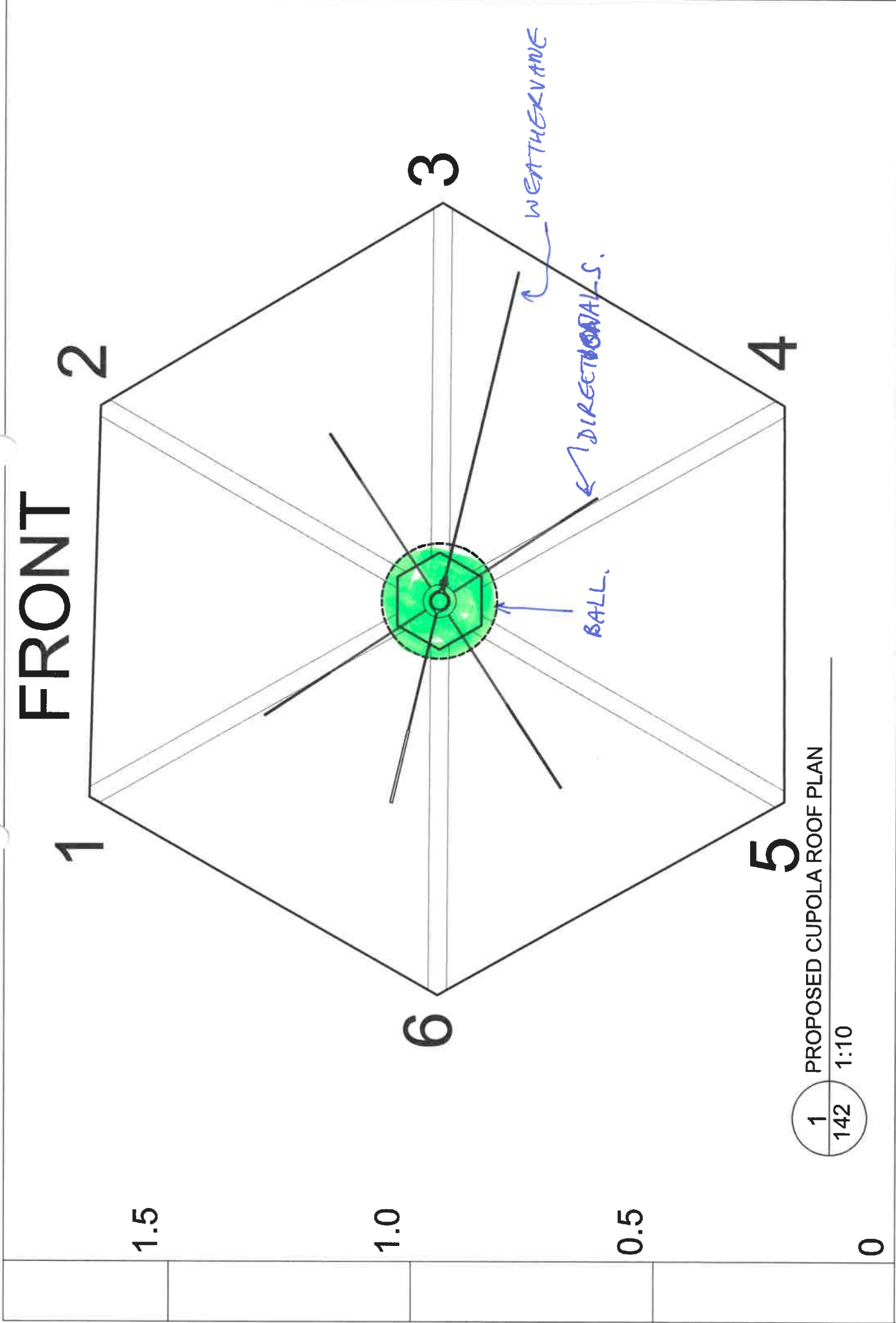
29/10/24 REVISION A.
 KEY COORDINATING DIMENSIONS
 ADDED AFTER SITE VISIT &
 INVESTIGATION 29/10/24.



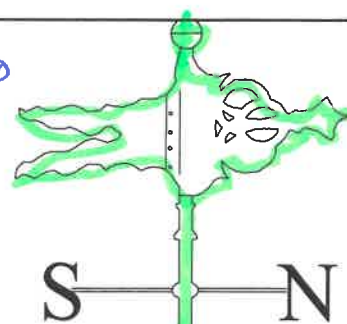
GAD'S HILL PLACE (H) PROPOSED ROOF PLAN

140 1:100





EXISTING/REFURBISHED
5 REPLACEMENT



FIT TIMBER
TIE BEAM ACROSS
RAFTERS TO RESTRAIN
BASE OF ROOF
STALK & SPINDLE

EXISTING SPINDLE
TO BE EXTENDED.
ROOF STALK/FINIAL
POST TO BE EXTENDED
& RESTRAINED BY
NEW TIMBER TIE
BEAM FOR GREATER
STABILITY.
CURVED RAFTERS

ARCHED FASCIA
BOARD DIMS TO
ENGINEER'S
RECOMMENDATIONS

See 5284/PL
196 for
detail

PROPOSED
T.O. EAVES RAIL

EXISTING
T.O. EAVES RAIL.

STOCK LOWERED TO JUST ABOVE THE GAVES RAIL TO AVOID CLASH BETWEEN BELL & RAIL.

LEAD ROOF
INSTALLED IN
WORKSHOP

T.O. OF
GANG
RAIL

REPLACEMENT
'TAPERED' POSTS

WEATHERING
GASKET T.B.D.

See 5284/PL/
146 juv
detrital 2

15 mm
WB
ply

15 mm
WBP
ply
↓
75 x 75
Joist

T.O. PLINTH.

← 870

T.O. HISTORIC
BASE (LEFT
ON SITE).

DAMAGED STRUT
TO BE REPLACED
BY CAP CON LTD.

CROSS STRUTS.

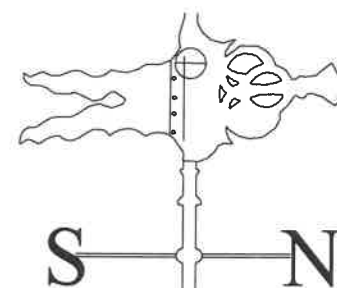
REPLACEMENT BASE
FRAME TO REST ON...
HISTORIC BASE
FRAME SUPPORTED
ON...
EXISTING CEILING
JOIST

PROPOSED CROSS SECTION

1:20

+86.00

5



STOCK LOWERED TO JUST ABOVE THE GAVES RAIL TO AVOID CLASH BETWEEN BELL & RAIL.

LEAD ROOF
INSTALLED IN
WORKSHOP

T.O. OF
GANG
RAIL

LEAD ROLL ON
PLINTH TO ALIGN
W/ ROLL ON
ROOF RIDGE
TILES.

LEAD -
FLASHING.
INSTALLED
ON SITE

114.5

2 FRONT

1

T.O.
PLINTH

870

1260

PROPOSED EAST (SIDE) ELEVATION

$$\begin{array}{r} 145 \overline{) 1:20} \end{array}$$

+86.00

Rev	Date	By	Notes
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Client: **GAD'S HILL SCHOOL**
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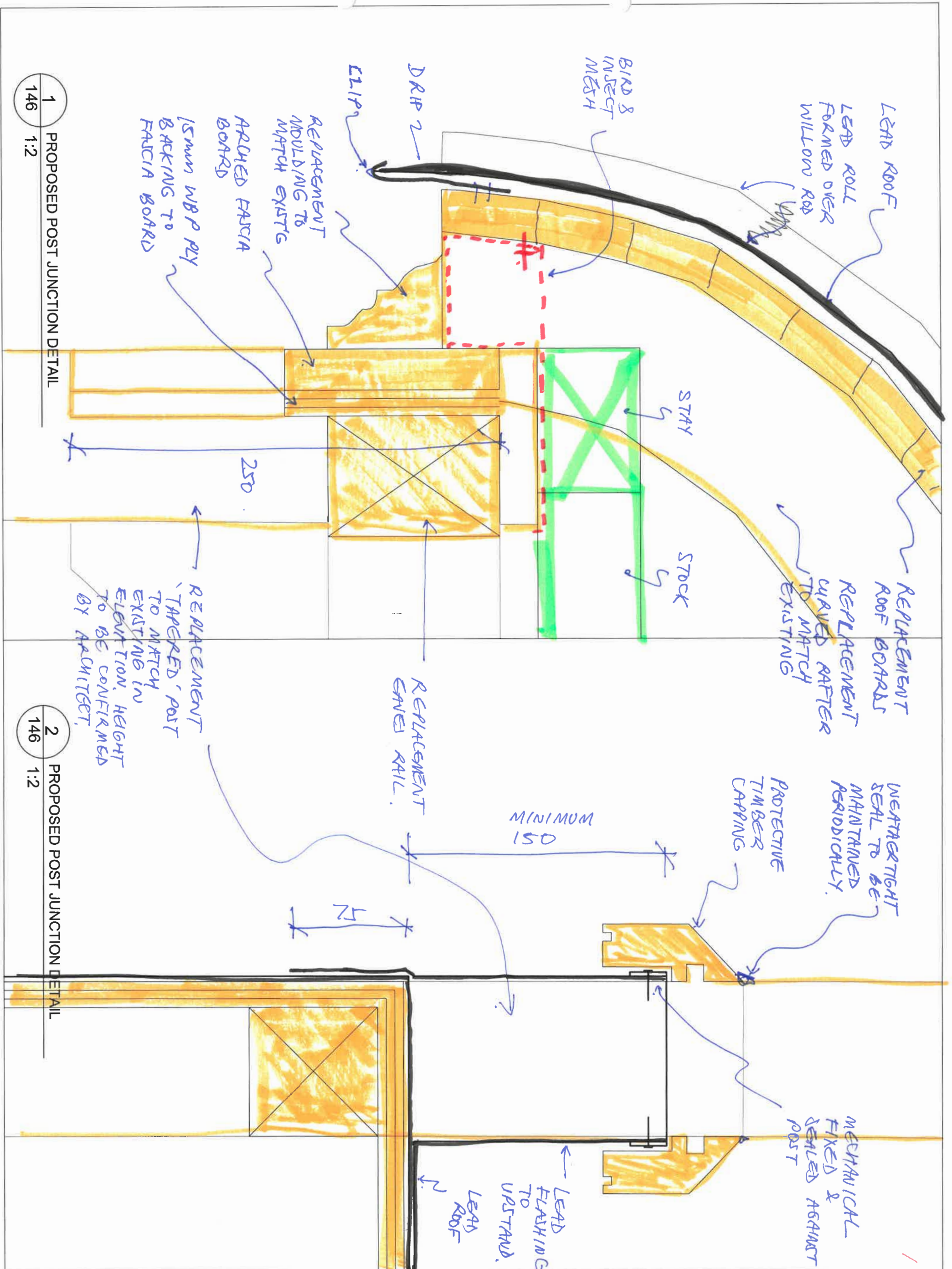
Client

Project
GAD'S HILL SCHOOL, HIGHAM
GAD'S HILL PLACE REPAIRS

EXISTING ROOF
STRUCTURE &
HISTORIC BASE
ADDED

Title: CUPOLA REPAIRS
 Scale: 1:20 @ A3 size
 Date: 29/07/2024
 Drawing No. 5284/PL/145
 Drawing Name: PROPOSED SECTION AND SIDE ELEVATION
 Authorised: CP
 Revision: A
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clay architecture



1
146
1:2

PROPOSED POST JUNCTION DETAIL

2
146
1:2

PROPOSED POST JUNCTION DETAIL

Project
GAD'S HILL SCHOOL, HIGHAM
GAD'S HILL PLACE REPAIRS

Client
GAD'S HILL SCHOOL

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Title
CUPOLA REPAIRS
PROPOSED JUNCTION DETAILS
Drawing No. 5284/PL/146

Scale 1:2 @ A3 size
Date 29/07/2024
Drawn GEN Authorised CP
Revision /

Rev. Date By Notes