

RECEIVED: 20/05/2026

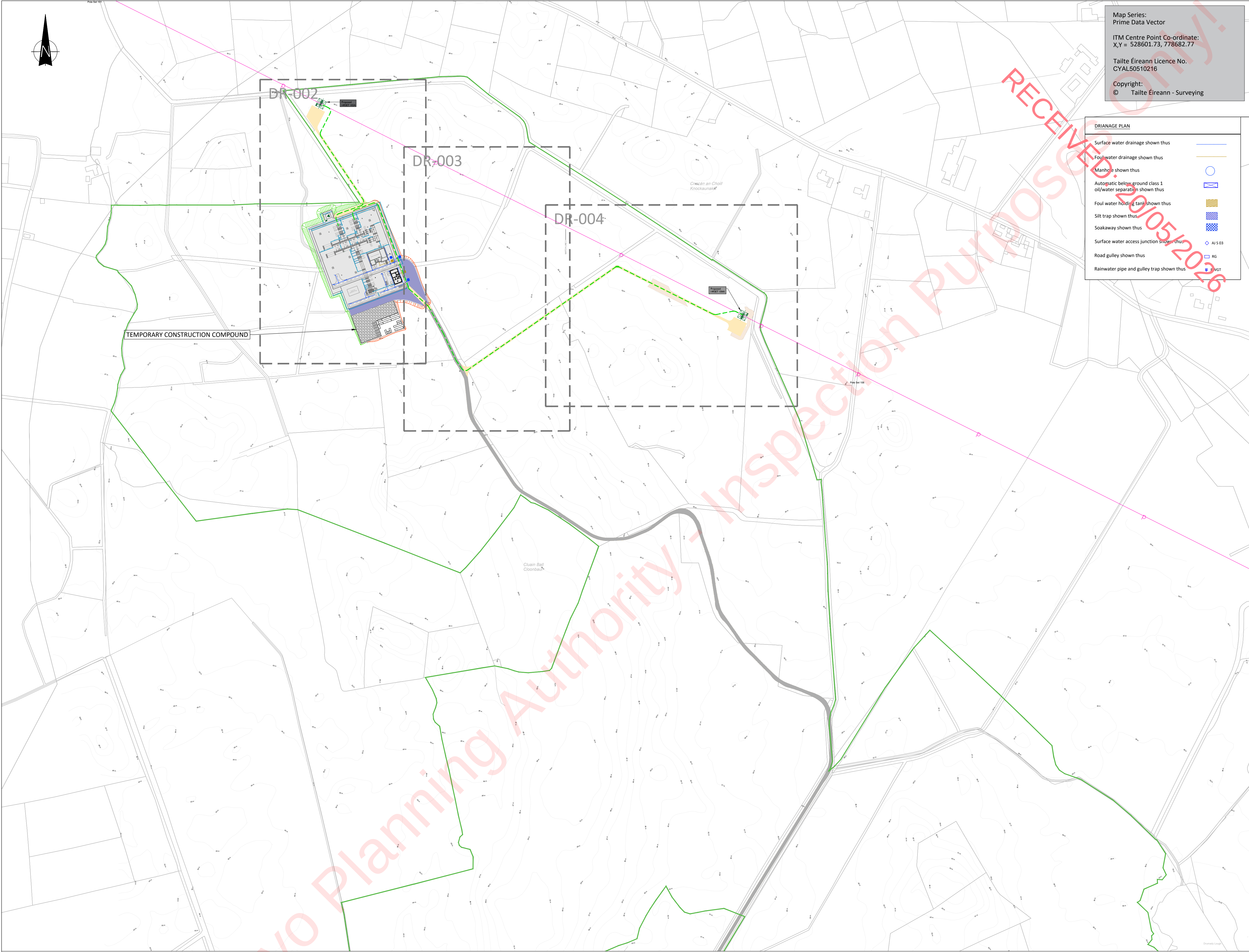
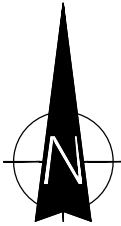


APPENDIX 4-2

GRID CONNECTION
INFRASTRUCTURE

ISO A1 594mm x 841mm

Project Management Initials: Designer: MKM Checked: ER Approved: AC



Overall Site Layout Plan
Scale: 1:2500



Map Series:
Prime Data Vector

ITM Centre Point Co-ordinate:
X,Y = 528601.73, 778682.77

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CYAL50510216

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DRAINAGE PLAN	
Surface water drainage shown thus	
Foul water drainage shown thus	
Manhole shown thus	
Automatic below ground class 1 oil/water separation shown thus	
Foul water holding tank shown thus	
Silt trap shown thus	
Soakaway shown thus	
Surface water access junction shown thus	
Road gully shown thus	
Rainwater pipe and gully trap shown thus	

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Tel: 00 44 1256406664

PROJECT

Cunlaghfadda Green
Energy Project

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- NOTES: -
1. Layout and Arrangements of Substation Building and Electrical Equipment is shown indicatively and for illustration purposes only.
 2. Dimensions shown are as per current Eirgrid Specifications at the time of submission. Dimensions may vary at time of construction to reflect any revisions to Eirgrid Specifications
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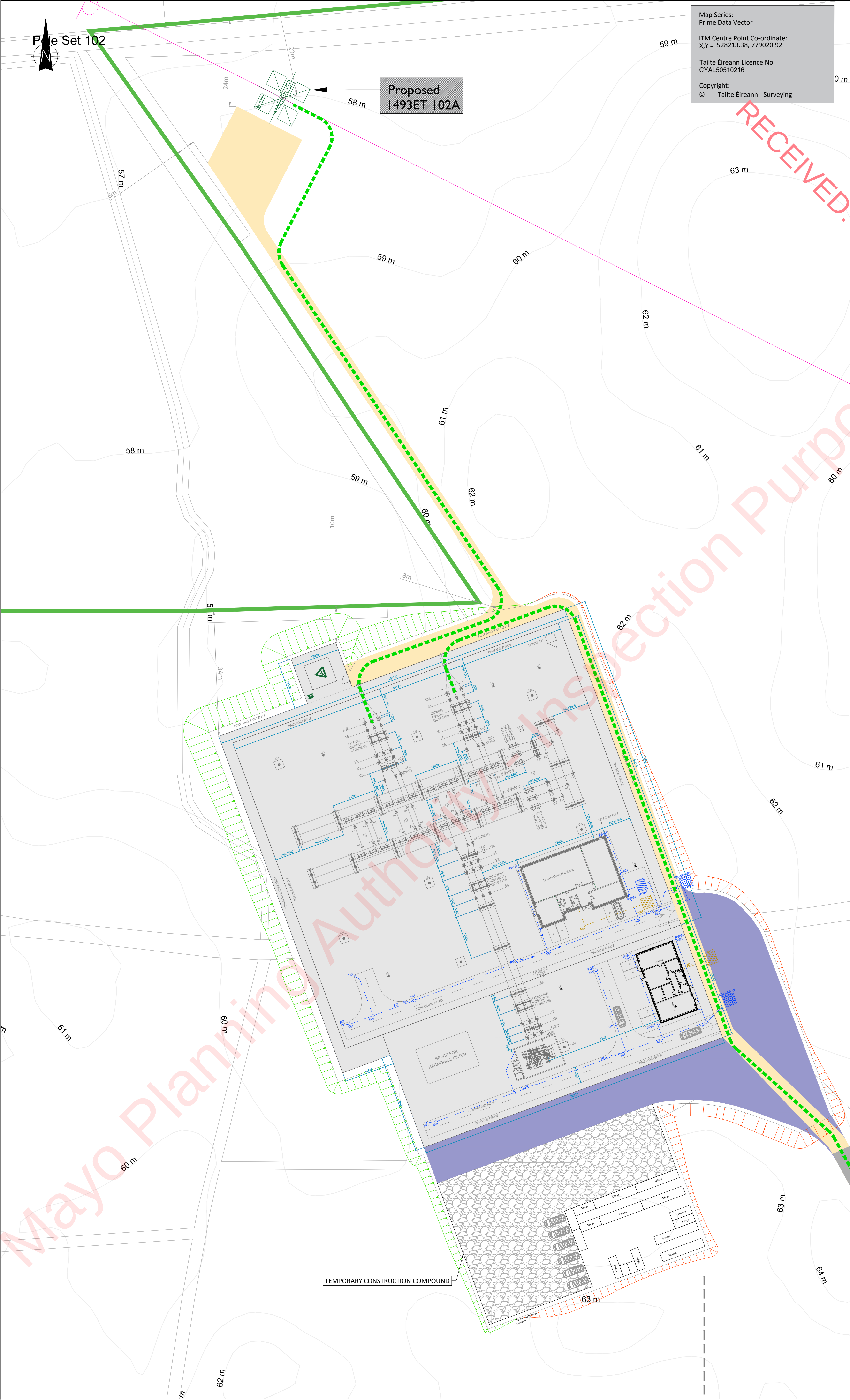
LEGEND: -	
110kV Substation Infrastructure	
Proposed Access Track subject to separate Planning Application	
Proposed New Access Track (Permanent)	
Temporary Construction Tracks	
Proposed Felling Area	
Underground Cable	
Existing OHL	
Existing Pole	
Proposed End Mast	
EIAR Site Boundary	
Contours shown thus	
Proposed Fill	
Proposed Cut	
Proposed Wind Farm subject to separate application	

ISSUE/REVISION		
P1	14.05.26	Issued for Planning
P0	06.05.26	Issued for Planning
I/R	DATE	DESCRIPTION

PROJECT NUMBER
05-981

SHEET TITLE
Overall Site Layout Plan

SHEET NUMBER
05981-DR-001a



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NO	DATE	DESCRIPTION
P1	14.05.26	Issued for Planning
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I/R	DATE	DESCRIPTION

PROJECT NUMBER

05-981

SHEET TITLE

Site Layout Plan
Sheet 1 of 3

SHEET NUMBER

05981-DR-002a



Map Series:
Prime Data Vector

ITM Centre Point Co-ordinate:
X,Y = 528434.96, 778987.83

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- LEGEND: -
- 110KV Substation Infrastructure
 - Existing OHL
 - Proposed Access Track
subject to separate
Planning Application
 - Proposed New Access Track
(Permanent)
 - Temporary Construction Tracks
 - Underground Cable
 - Existing Pole
 - EIAR Site Boundary
 - Contours shown thus
 - Proposed Fill
 - Proposed Cut
 - Proposed Wind Farm
subject to separate
application

DRAINAGE PLAN	
Surface water drainage shown thus	
Foul water drainage shown thus	
Manhole shown thus	
Automatic below ground class 1 oil/water separation shown thus	
Foul water holding tank shown thus	
Silt trap shown thus	
Soakaway shown thus	
Surface water access junction shown thus	AI S 03
Road gully shown thus	RG
Rainwater pipe and gully trap shown thus	RWGT

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SHEET TITLE

Site Layout Plan
Sheet 2 of 3

SHEET NUMBER

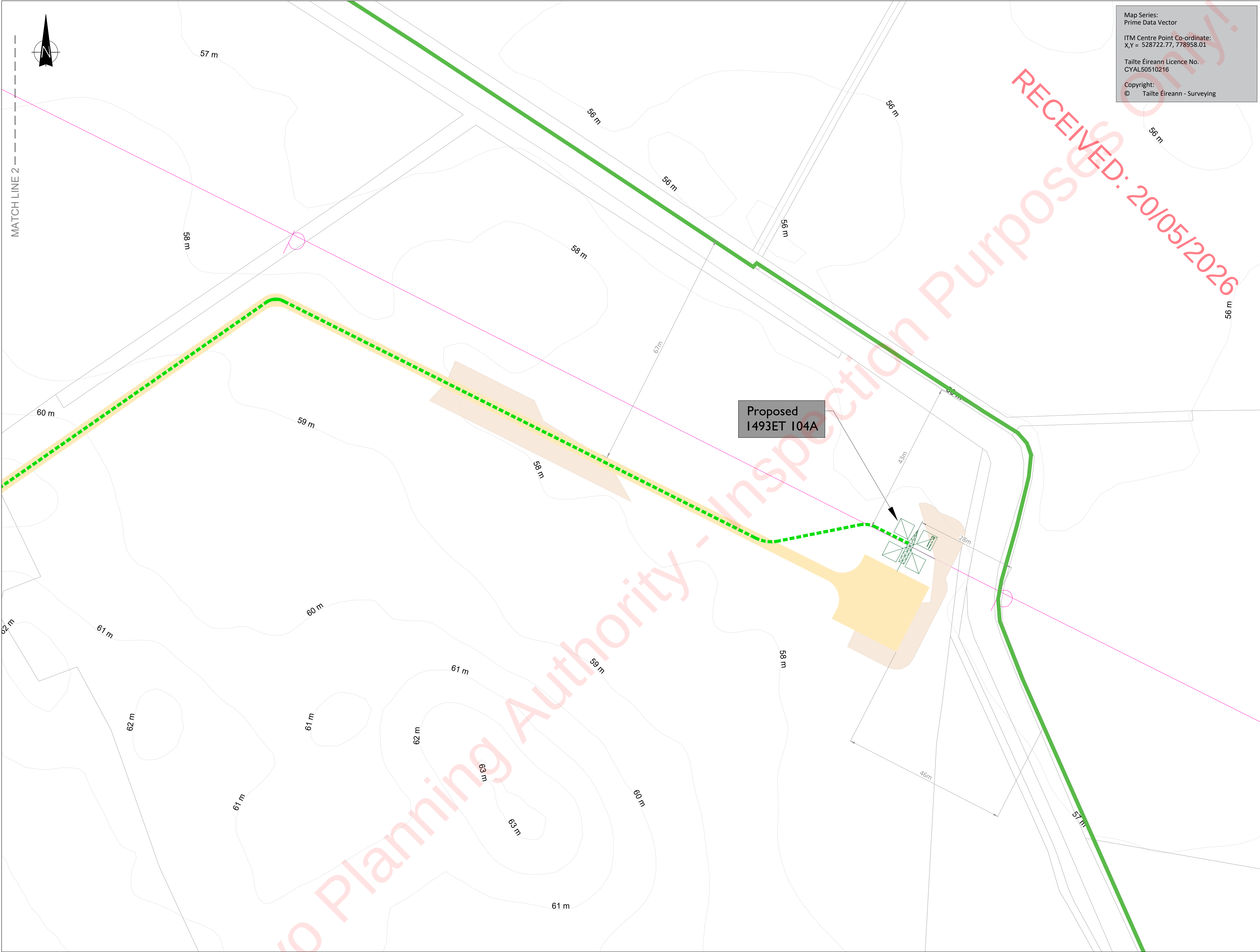
05981-DR-003a

Site Layout Plan
Scale: 1:500



ISO A1 594mm x 841mm

Project Management Initials: Designer: MKM Checked: ER Approved: AC



Map Series:
Prime Data Vector

ITM Centre Point Co-ordinate:
X,Y = 528722.77, 778958.01

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LEGEND: -

Proposed New Access Track (Permanent)	
Proposed Felling Area	
Underground Cable	
Existing OHL	
Proposed End Mast	
EIAR Site Boundary	
Contours shown thus	
Propose Wind Farm subject to separate application	

ISSUE/REVISION

P1	14.05.26	Issued for Planning
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SHEET TITLE

Site Layout Plan
Sheet 3 of 3

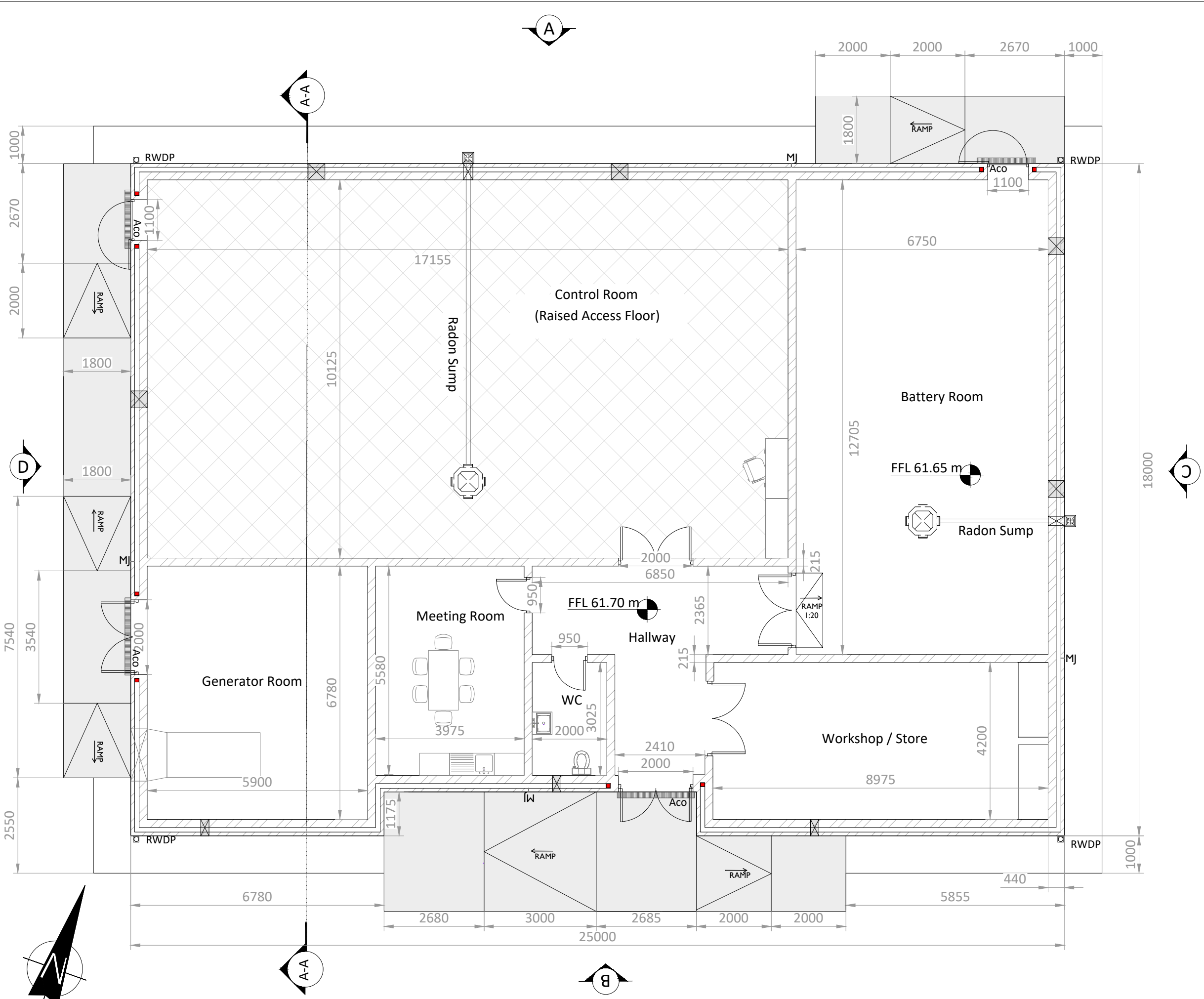
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05-981-DR-004a

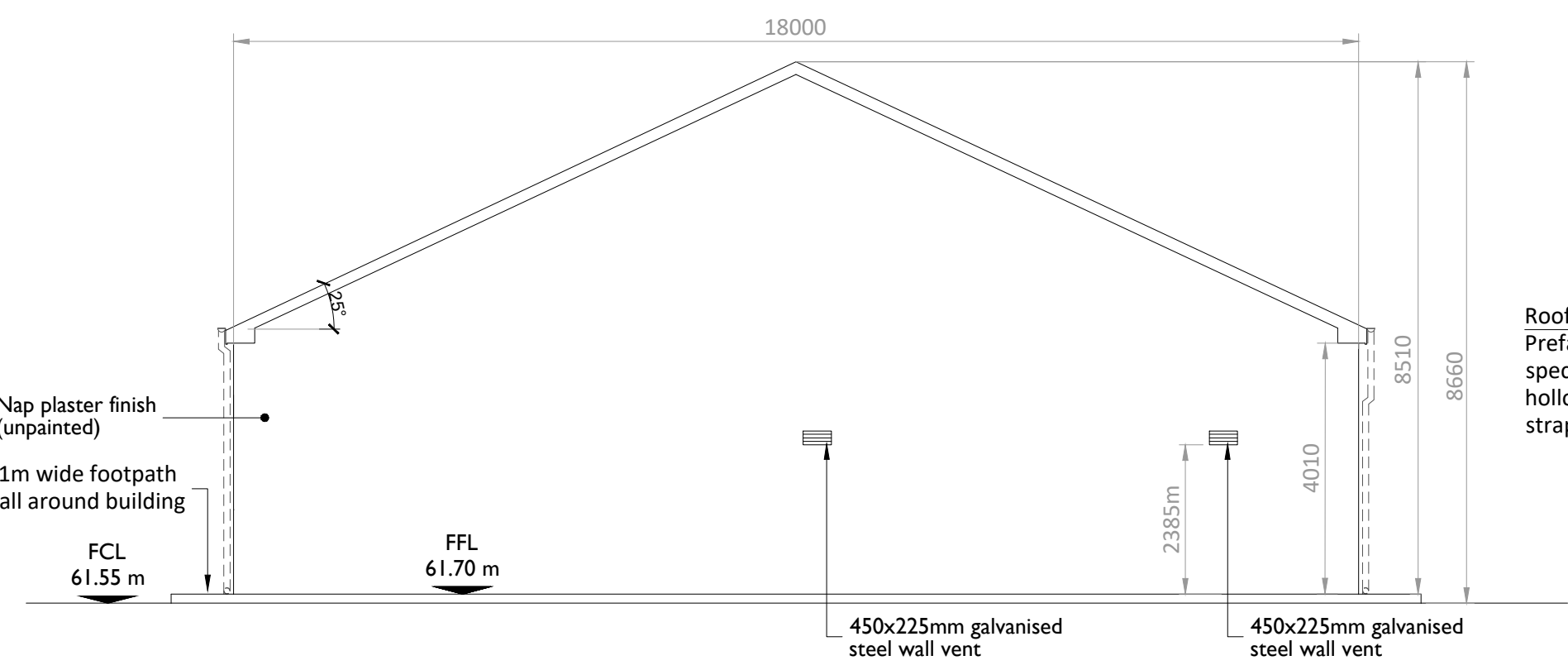
Site Layout Plan
Scale: 1:500

ISO A1 594mm x 841mm

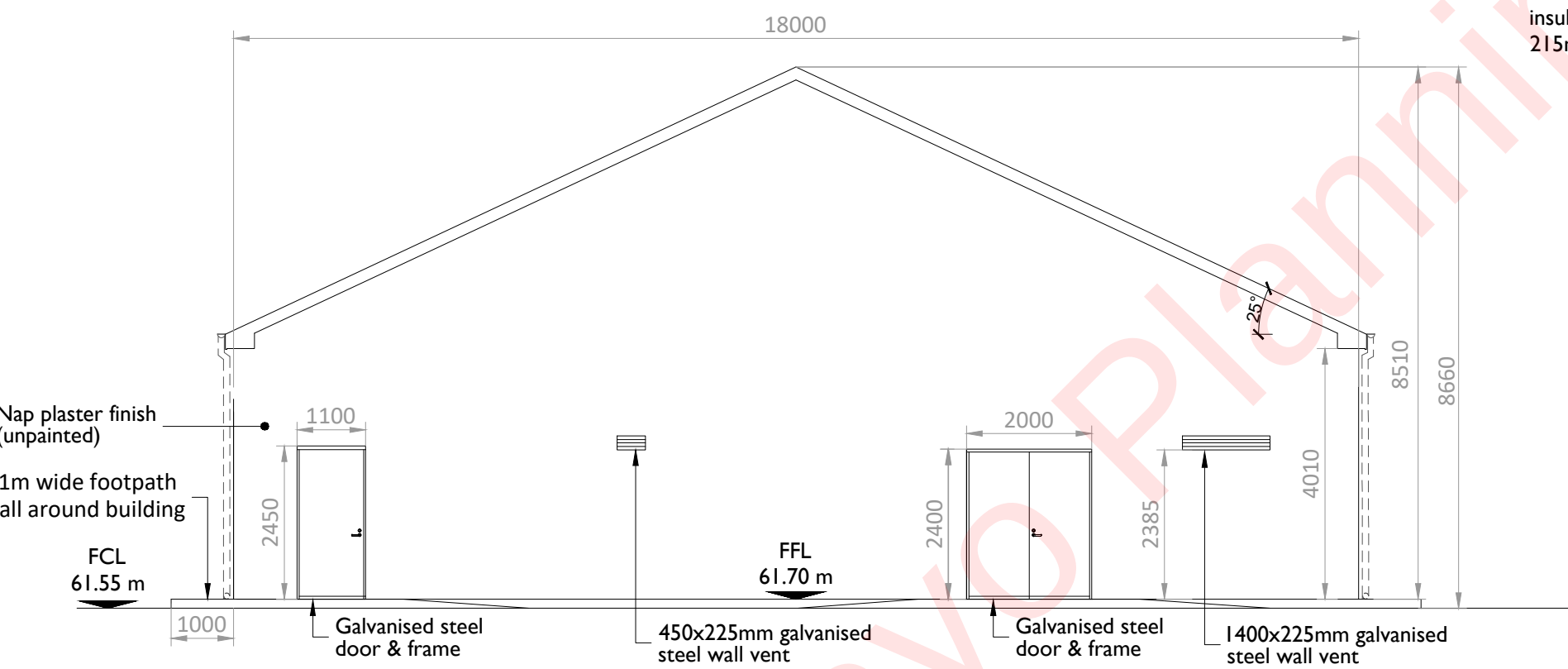
Project Management Initials: Designer: JC Checked: AB Approved: GH



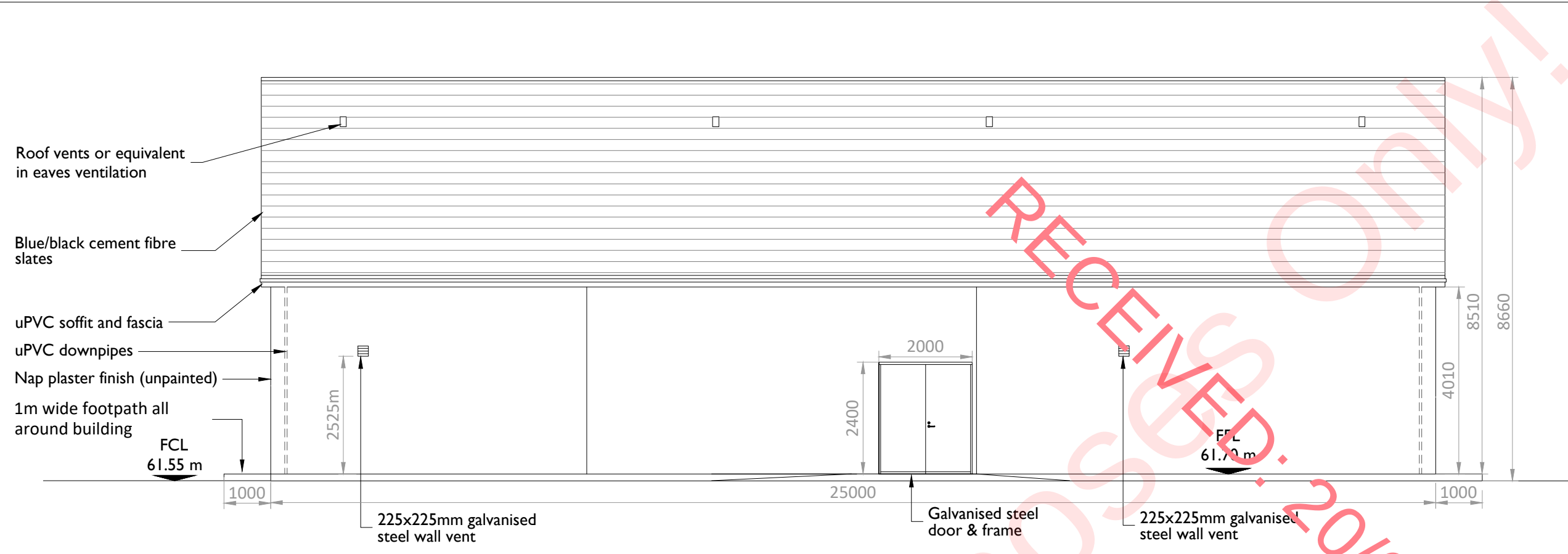
PLAN - CONTROL BUILDING
Scale : 1:100



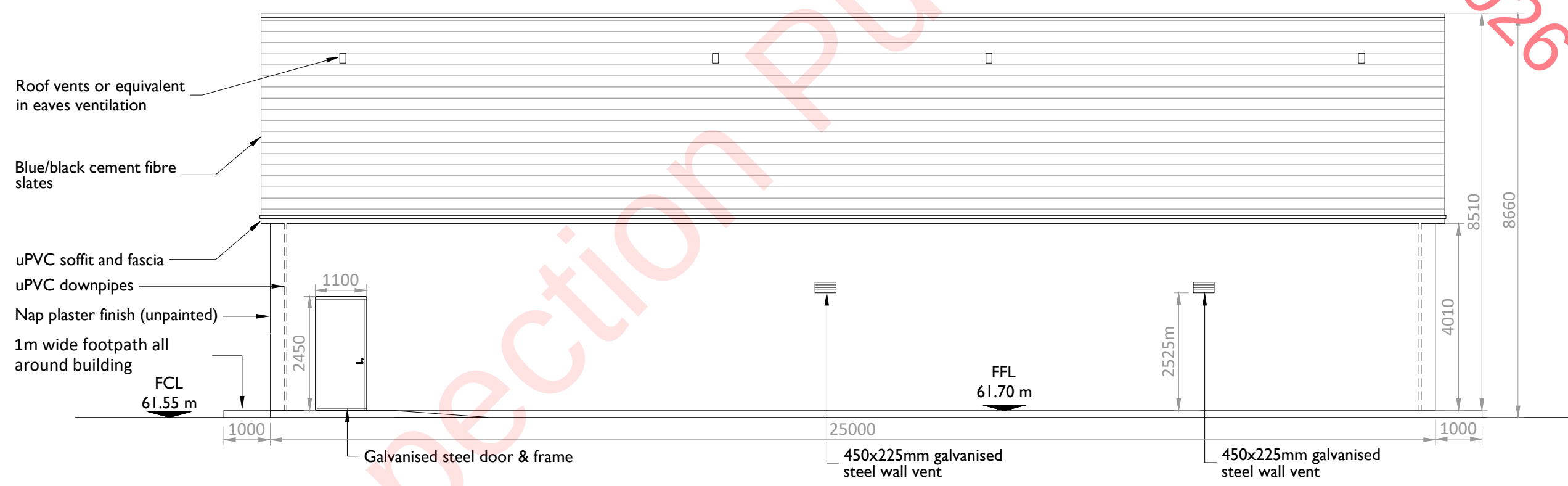
ELEVATION C
Scale : 1:100



ELEVATION D
Scale : 1:100



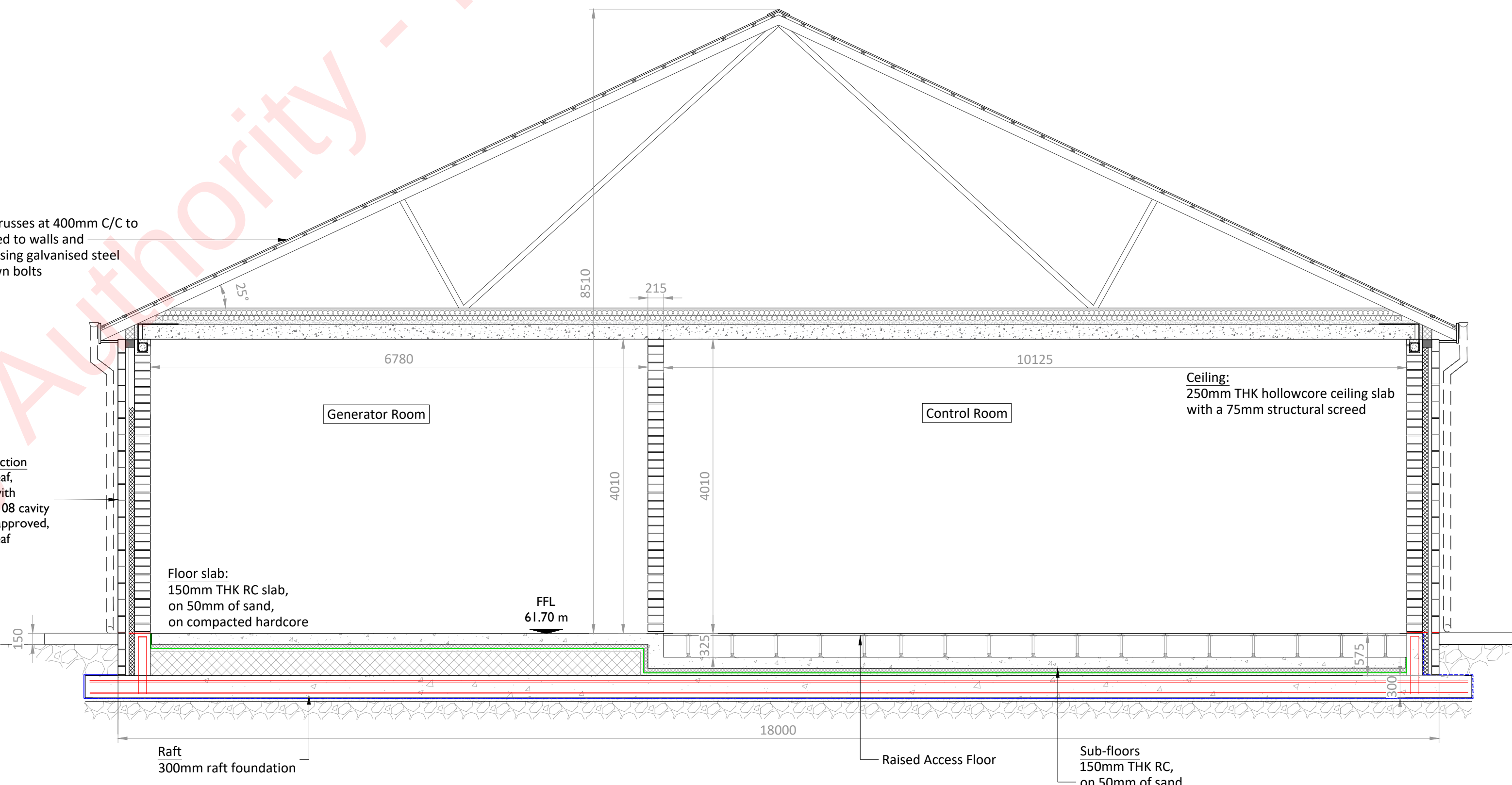
ELEVATION B
Scale : 1:100



ELEVATION A
Scale : 1:100

Roof construction:
Prefabricated roof trusses at 400mm C/C to specialist design fixed to walls and hollowcore ceiling using galvanised steel straps and hold down bolts

External wall construction
100mm thick outer leaf, 110mm thick cavity with 70mm Kooltherm K108 cavity insulation or similar approved, 215mm thick inner leaf



SECTION A-A
Scale : 1:50

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LEGEND: -

Finished Floor Level shown thus	FFL 61.70
Finished Compound Level shown thus	FCL 61.55

ISSUE/REVISION

P2	11.03.26	Issued for Planning
P1	09.01.26	Issued for Planning
P0	07.02.24	Issued for Planning
I/R	DATE	DESCRIPTION

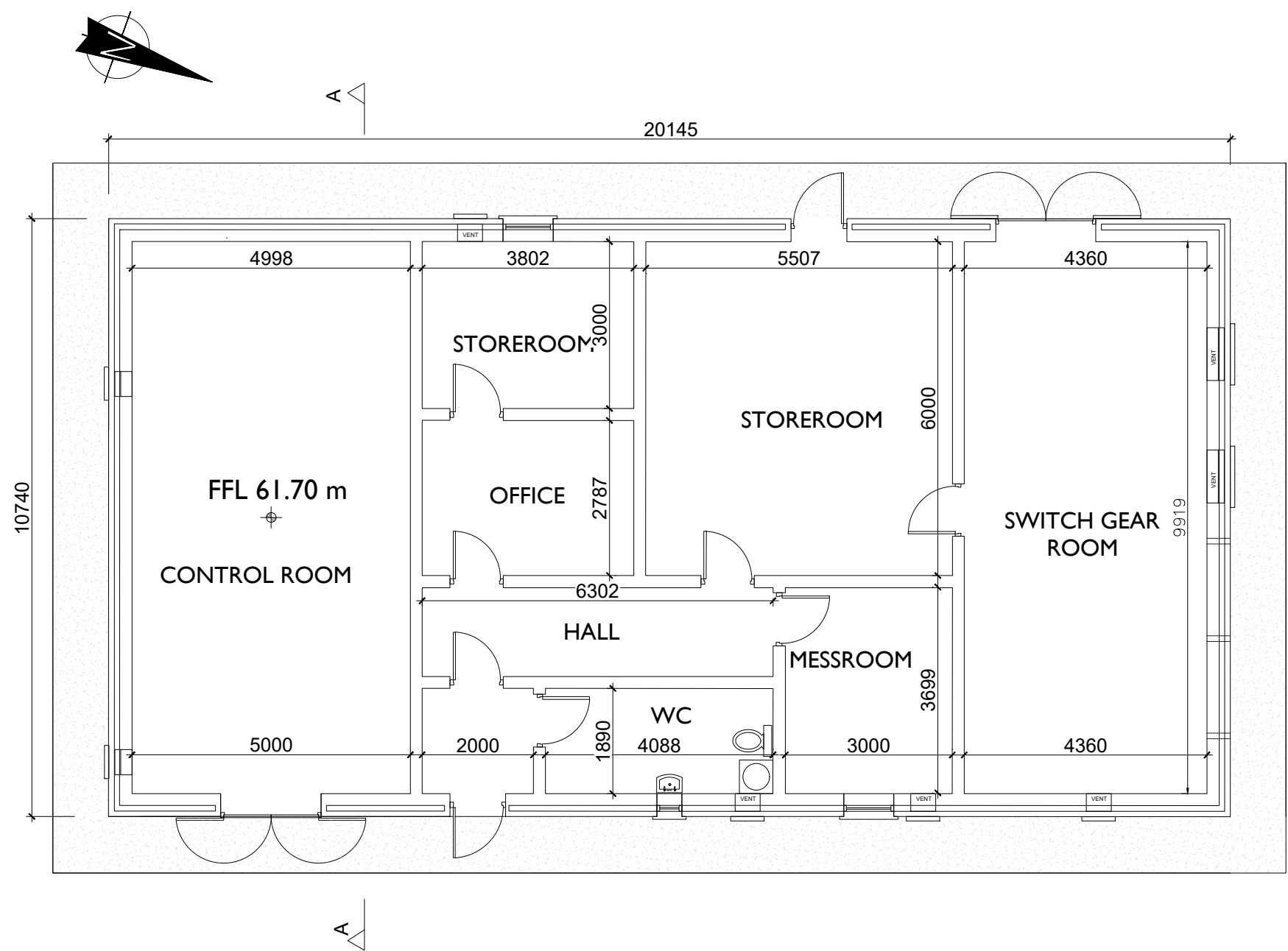
PROJECT NUMBER
05-981

SHEET TITLE
Eirgrid Control Building Plan, Elevations and Section

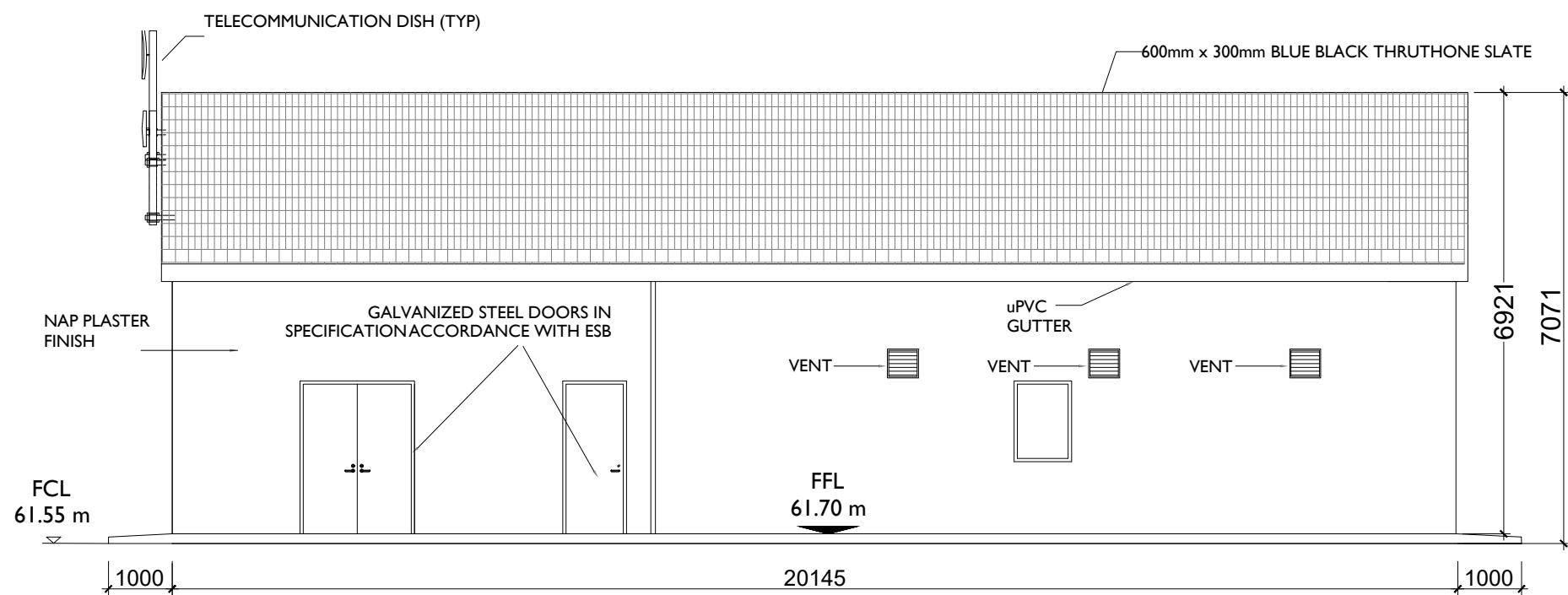
SHEET NUMBER
05981-DR-101

ISO A1 594mm x 841mm

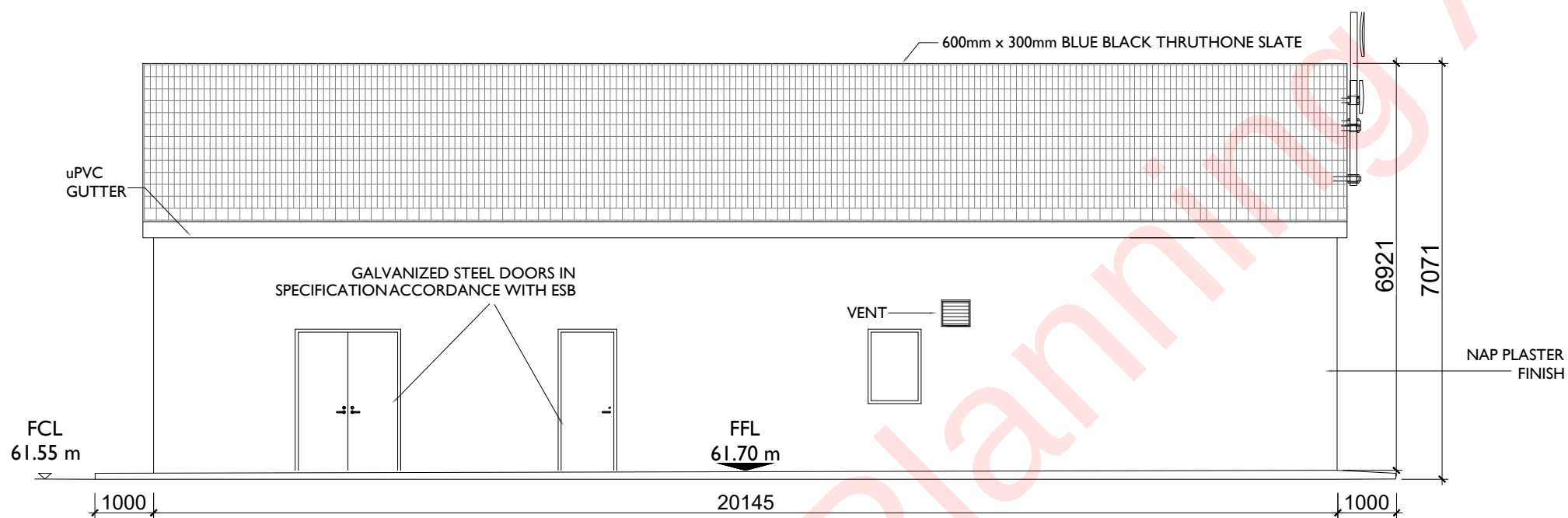
Project Management Initials: Designer: JC Checked: AB Approved: GH



PLAN - CONTROL BUILDING
Scale : 1:100

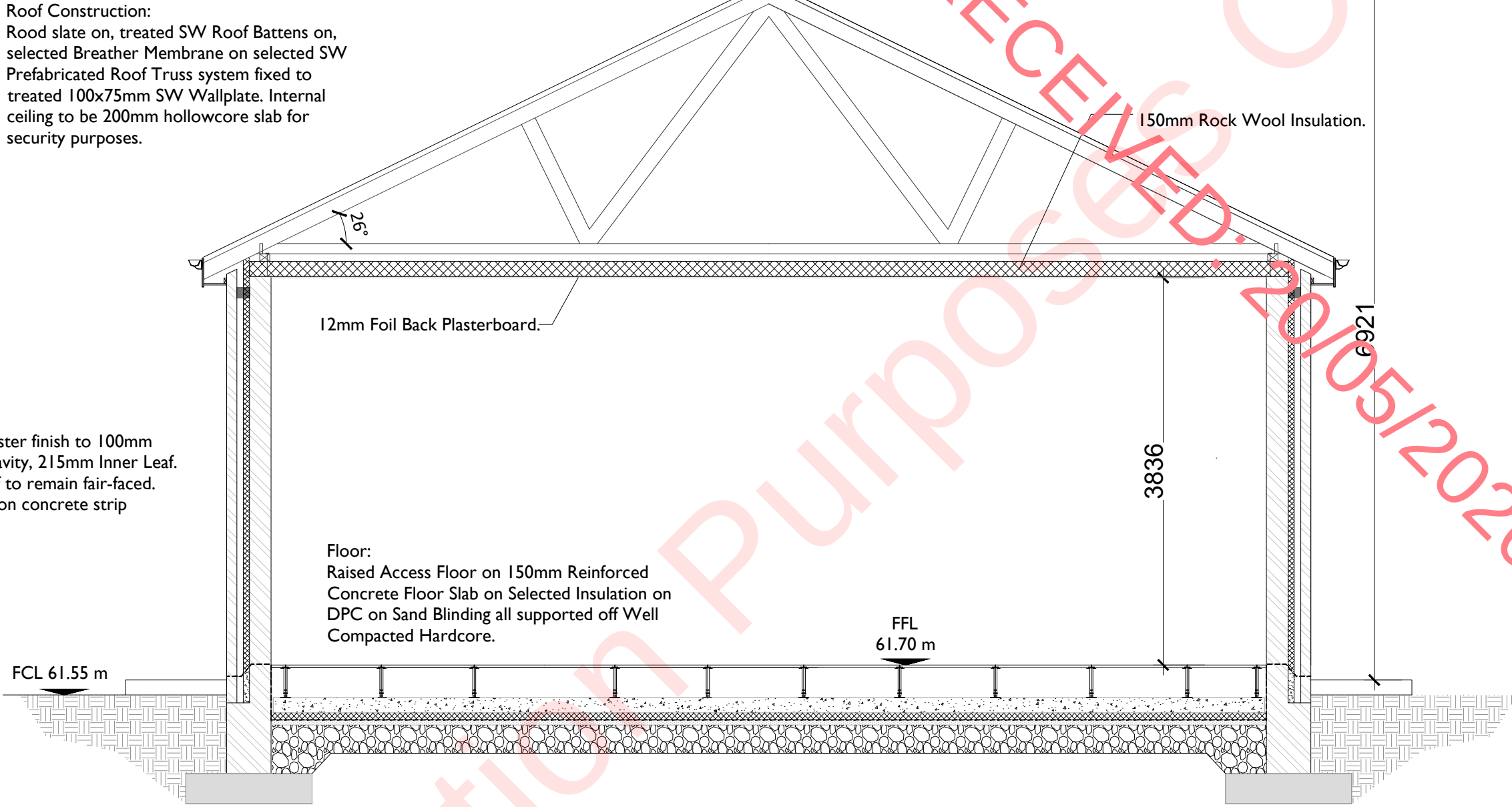


SOUTH WEST ELEVATION
Scale : 1:100

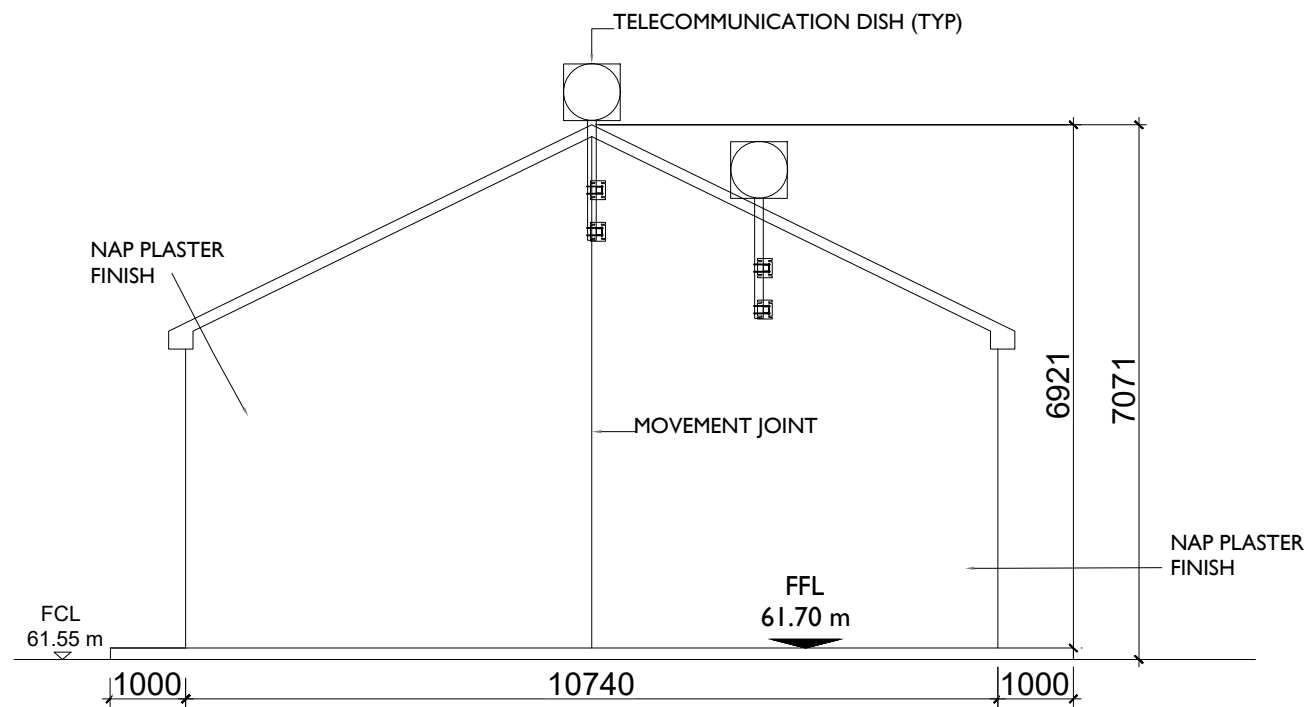


NORTH EAST ELEVATION
Scale : 1:100

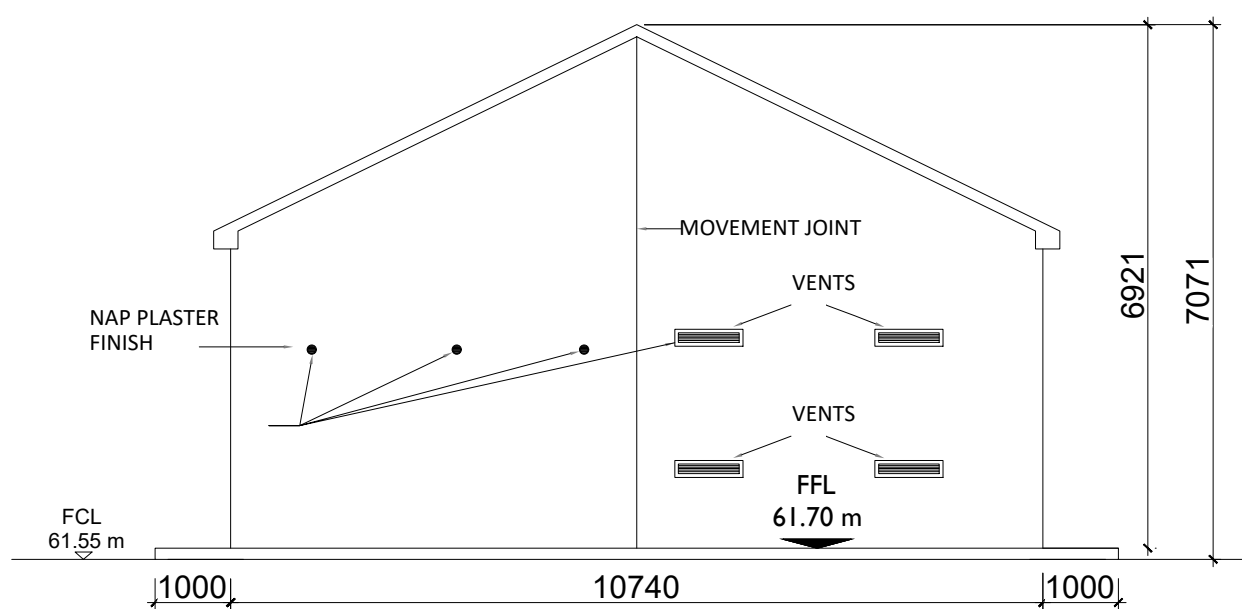
Cavity Wall:
Flat Sand / Cement Plaster finish to 100mm
Outer Leaf, 100mm Cavity, 215mm Inner Leaf.
Inside face of inner leaf to remain fair-faced.
Cavity wall supported on concrete strip foundation.



SECTION A-A
Scale : 1:50



SOUTH EAST ELEVATION
Scale : 1:100



NORTH WEST ELEVATION
Scale : 1:100



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LEGEND: -

Finished Floor Level shown thus $\text{FFL } 61.70 \text{ m}$

Finished Compound Level shown thus $\text{FCL } 61.55 \text{ m}$

ISSUE/REVISION

P3	11.03.26	Issued for Planning
P2	09.01.26	Issued for Planning
P1	19.05.25	Issued for Planning
P0	07.02.24	Issued for Planning
I/R	DATE	DESCRIPTION

PROJECT NUMBER

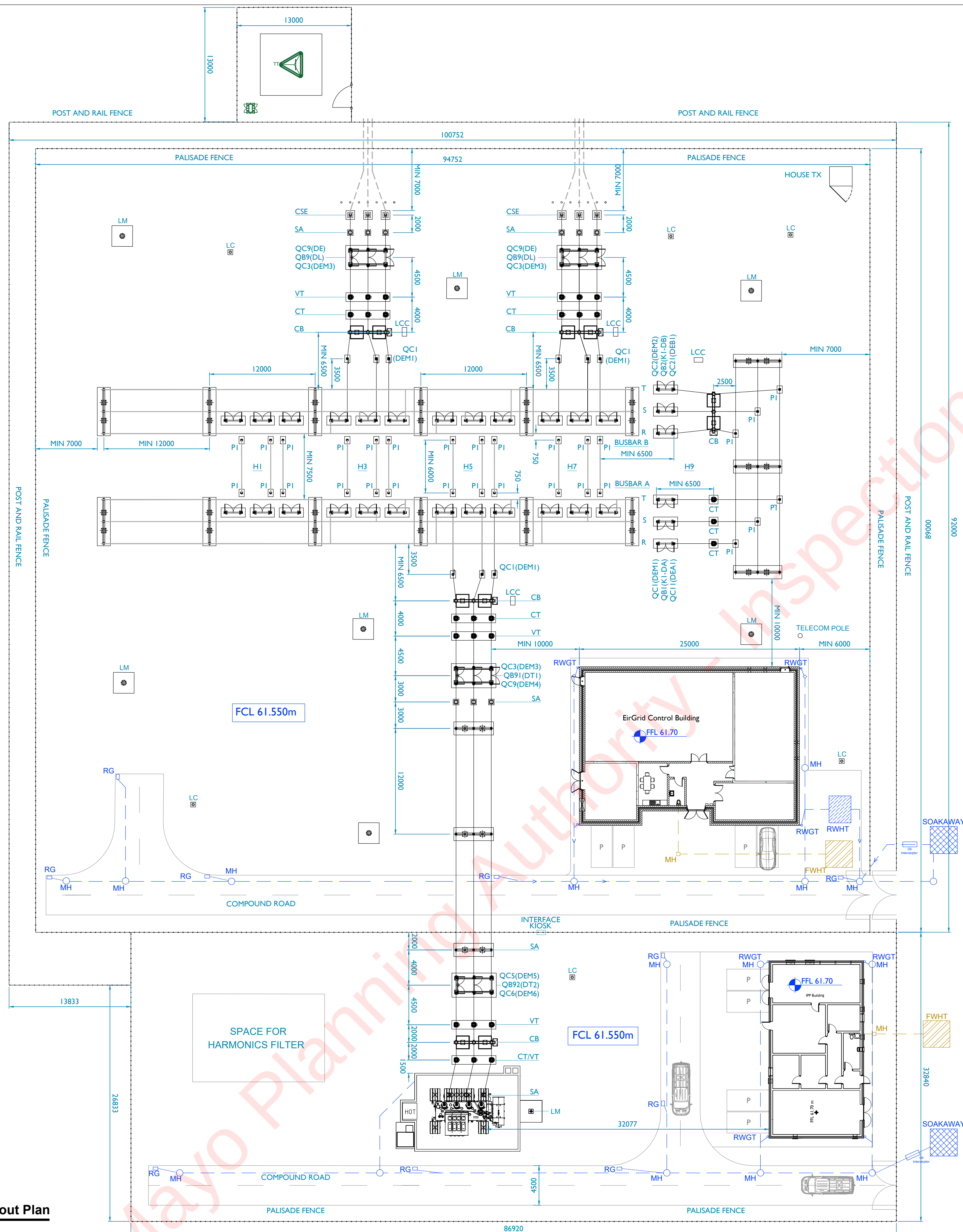
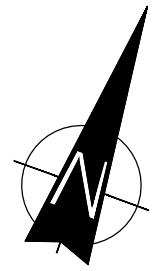
05-981

SHEET TITLE

IPP Building Plan, Elevations
and Section

SHEET NUMBER

05981-DR-102



Substation Layout Plan

Scale: 1:250

DRAINAGE PLAN	
Surface water drainage shown thus	
Foul water drainage shown thus	
Manhole shown thus	
Automatic below ground class 1 oil/water separation shown thus	
Foul water holding tank shown thus	
Silt trap shown thus	
Soakaway shown thus	
Surface water access/junction shown thus	 AJ S 03
Road gully shown thus	 RG
Rainwater pipe and gully trap shown thus	 RWGT

Item	Description
CSE	Cable Sealing End
SA	Surge Arrestor
DL/DE	Line / Earth Disconnect
VT	Voltage Transformer
CT	Current Transformer
CB	Circuit Breaker
BD	Busbar Disconnect
PI	Post Insulator
LM	Lightning Mast
LCC	Local Control Cabinet
IK	Interface Kiosk
DG	Diesel Generator
HOT	House Transformer
MH	Manhole
TT	Telecommunications Tower



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LEGEND: -

ISSUE/REVISION

P5	14.05.26	Issued for Planning
P4	17.04.26	Issued for Planning
P3	11.03.26	Issued For Planning
P2	09.01.26	Issued For Planning
P1	19.06.2025	Issued For Planning
P0	07.02.24	Issued For Planning
I/R	DATE	DESCRIPTION

PROJECT NUMBER

05-981

SHEET TITLE

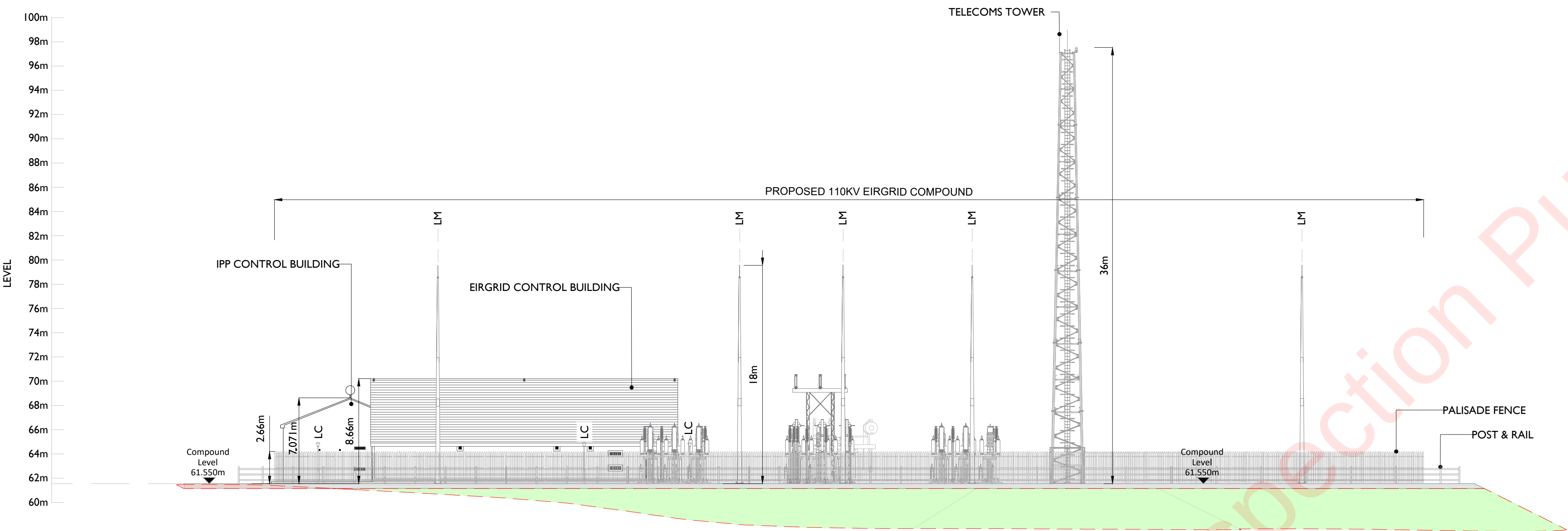
Substation Layout Plan

SHEET NUMBER

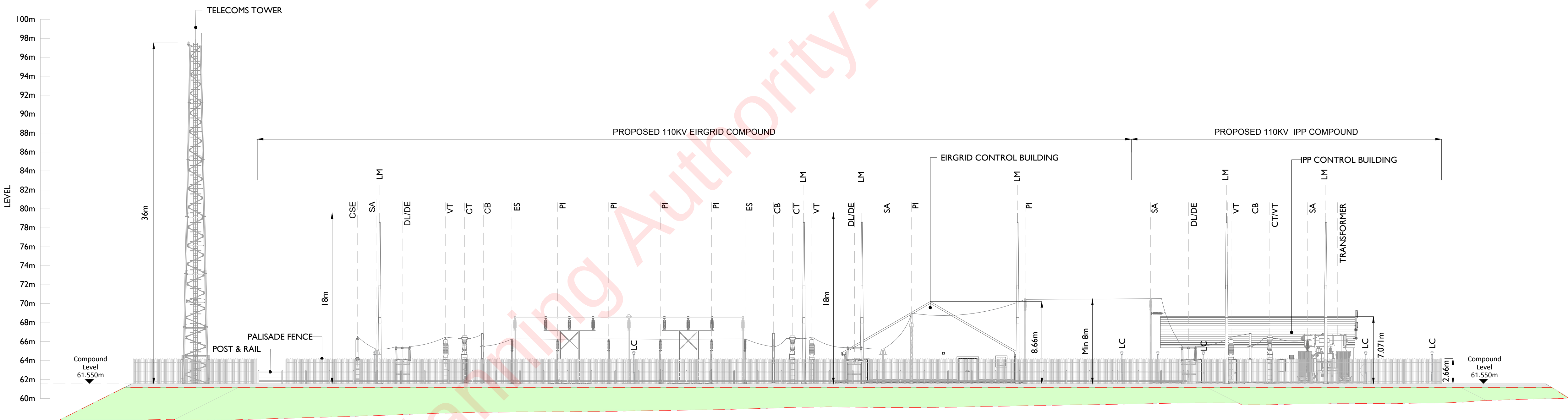
05981-DR-103

ISO A1 594mm x 841mm

Project Management Initials: Designer: JF Checked: ER Approved: AC



North Elevation
Scale: 1:250

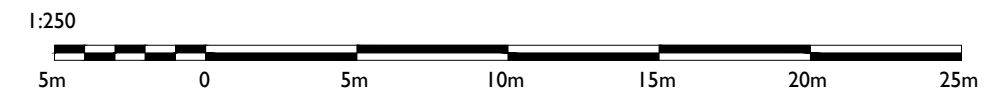


West Elevation
Scale: 1:250

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Key Plan
Scale: 1:2000





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- LEGEND: -
- Cut Earthworks shown thus

Fill Earthworks shown thus

	Description
CSE	Cable Sealing End.
SA	Surge Arrester.
DLUDE	Line / Earth Disconnect.
VT	Voltage Transformer.
CT	Current Transformer.
CB	Circuit Breaker.
LM	Lightning Mast.
LC	Lighting Column.
PI	Post Insulator.
ES	Earth Switch

ISSUE/REVISION		
P3	17.04.26	Issued for Planning
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N1	23.05.25	Issued for Information
P0	12.02.24	Issued for Planning
I/R	DATE	DESCRIPTION

PROJECT NUMBER

05-981

SHEET TITLE

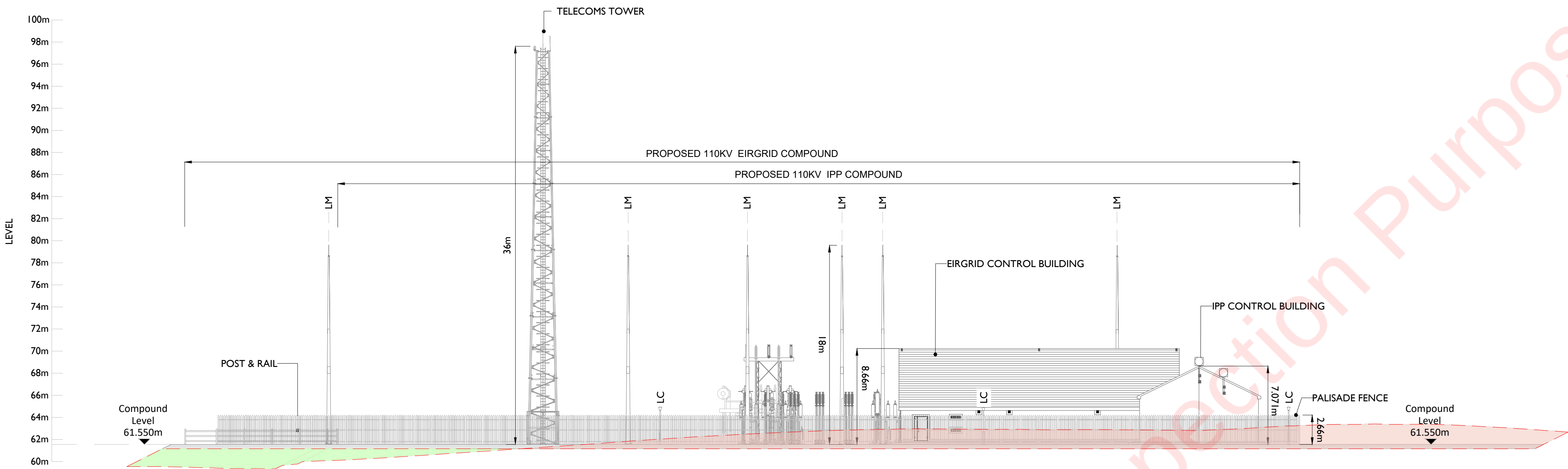
Substation Elevations
Sheet 1 of 2

SHEET NUMBER

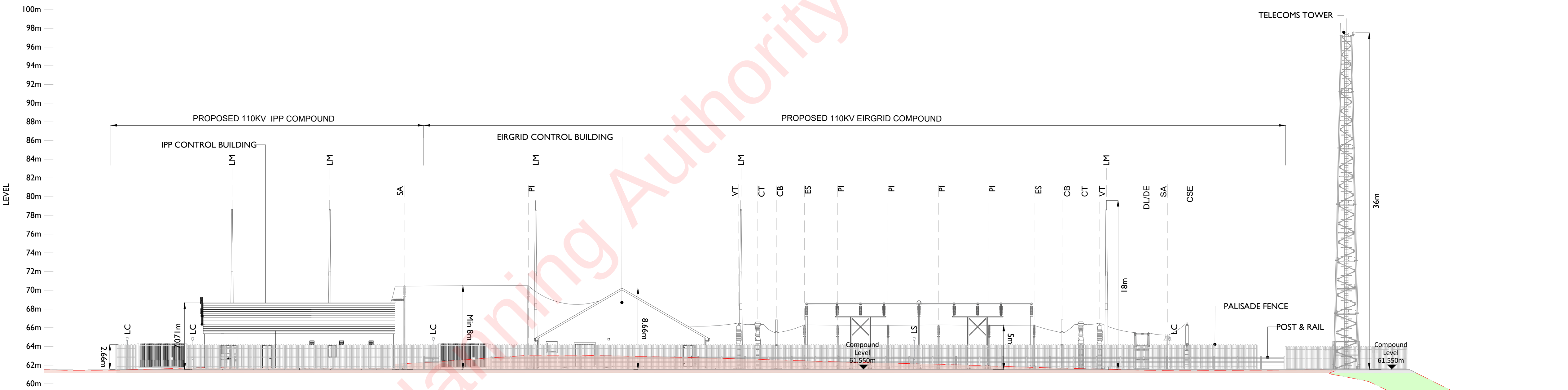
05981-DR-104

ISO A1 594mm x 841mm

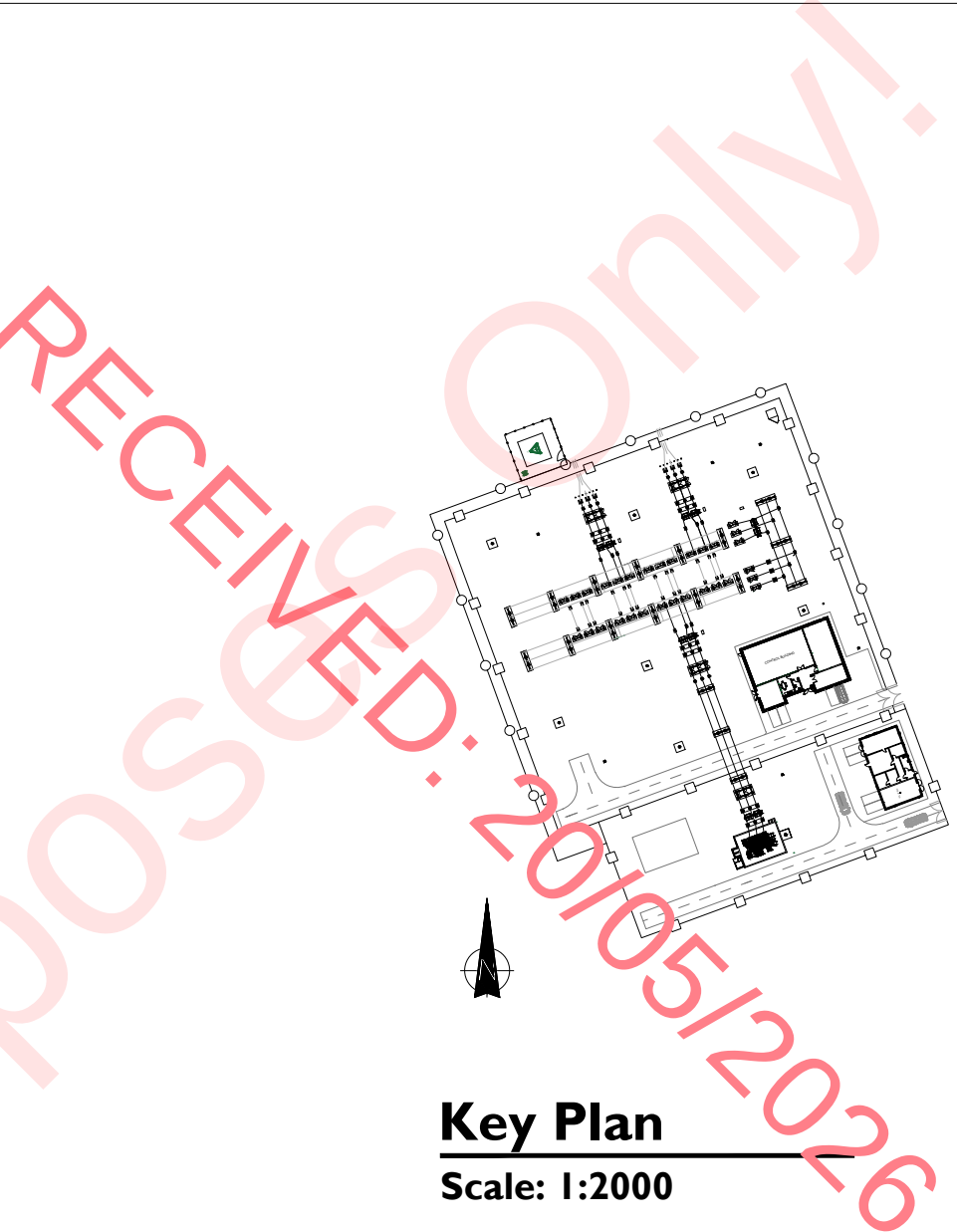
Project Management Initials: Designer: JF Checked: ER Approved: AC



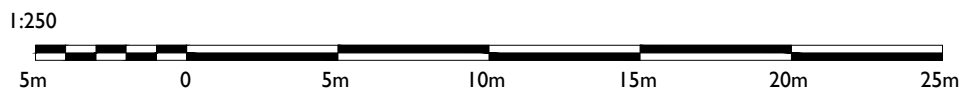
South Elevation
Scale: 1:250



East Elevation
Scale: 1:250



Key Plan
Scale: 1:2000





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- LEGEND: -

Description	
CSE	Cable Sealing End.
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DLDE	Line / Earth Disconnect.
VT	Voltage Transformer.
CT	Current Transformer.
CB	Circuit Breaker.
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ES	Earth Switch

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P3	17.04.26	Issued for Planning
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P0	13.06.25	Issued for Information

PROJECT NUMBER

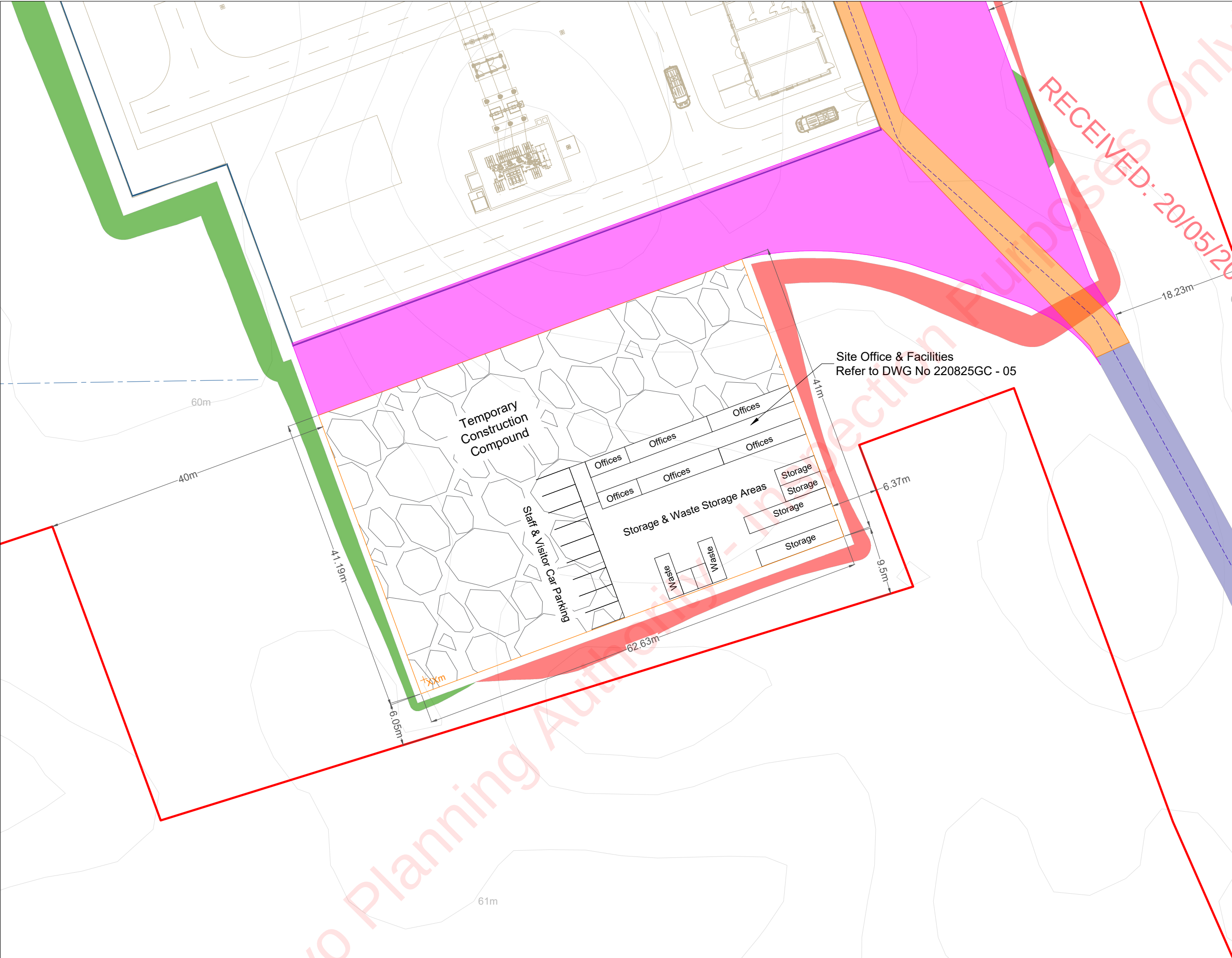
05-981

SHEET TITLE

Substation Elevations
Sheet 2 of 2

SHEET NUMBER

05981-DR-105



Project Design Drawing Notes

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2. Drawings not to be used for construction/contract conditions.
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5. All contractors, whether main or sub-contractors, must visit the site and are responsible for taking and checking any and all dimensions and levels that relate to the works.
6. The use of or reliance upon this drawing shall be deemed to be acceptance of these conditions of use unless otherwise agreed in writing, such written agreement to be sought from and issued by the copyright holder to the use or reliance upon this drawing.
7. Layout plans show typical Turbine rotor diameter as per turbine drawing.
8. Final levels may vary depending on local ground conditions.

- Drawing Legend**
- Planning Application Boundary
 - Proposed new access track (permanent)
 - Temporary Construction Tracks
 - Temporary Construction Compound
 - Cut
 - Fill
 - Wind Farm Elements
(Not subject of this planning application)
 - Electrical Cable Trench



PROJECT TITLE:
Cunlaghfadda Green Energy Project

DRAWING TITLE:
Temporary Construction Compound

PROJECT No.: 220825	DRAWING No.: 220825GC - 04	SCALE: 1:500 @ A3
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DRAWN BY: FB	CHECKED BY: GO	DATE: 20.05.2026	REVISION: D02
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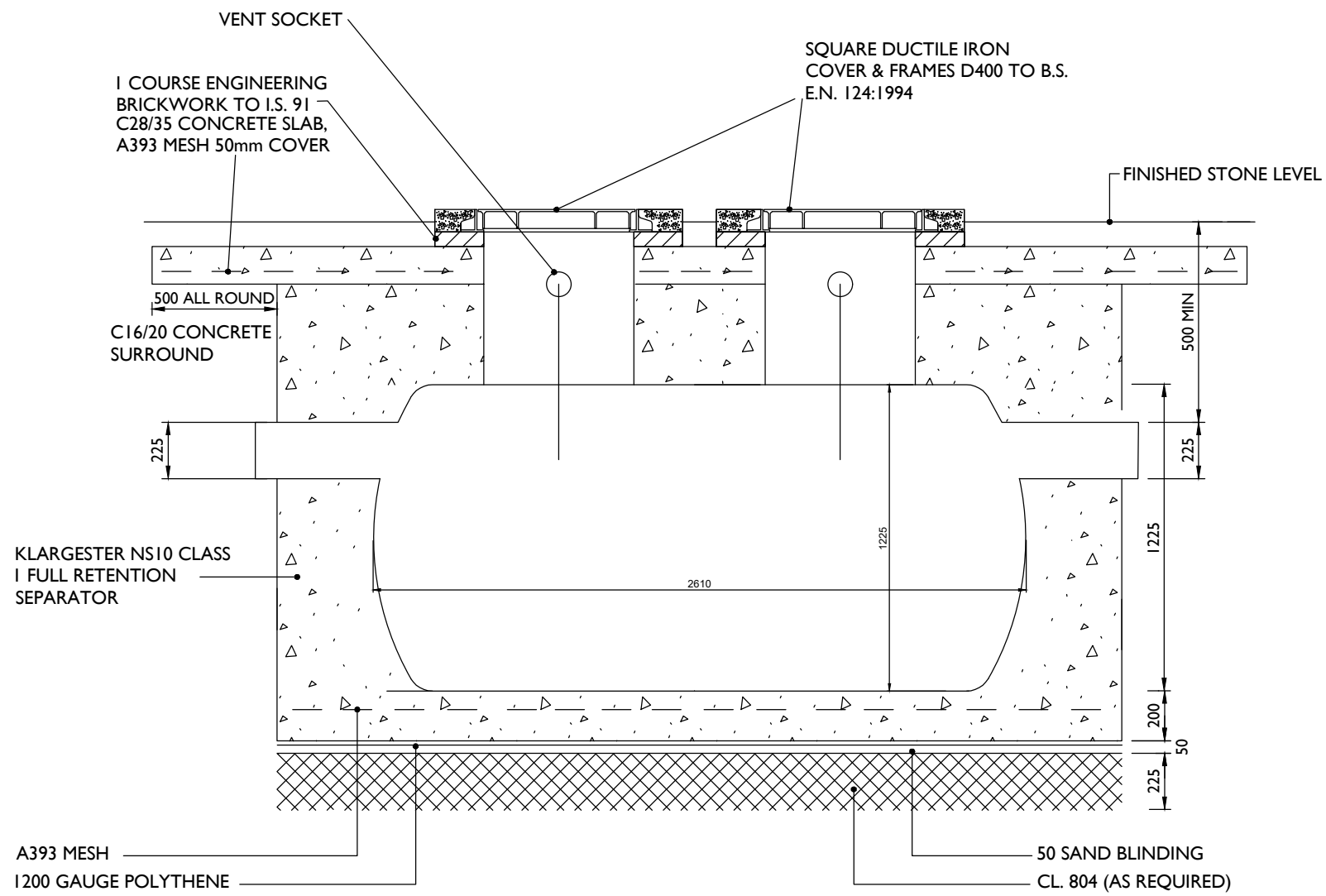
OS SHEET No.:
2209,2210,2273,2274



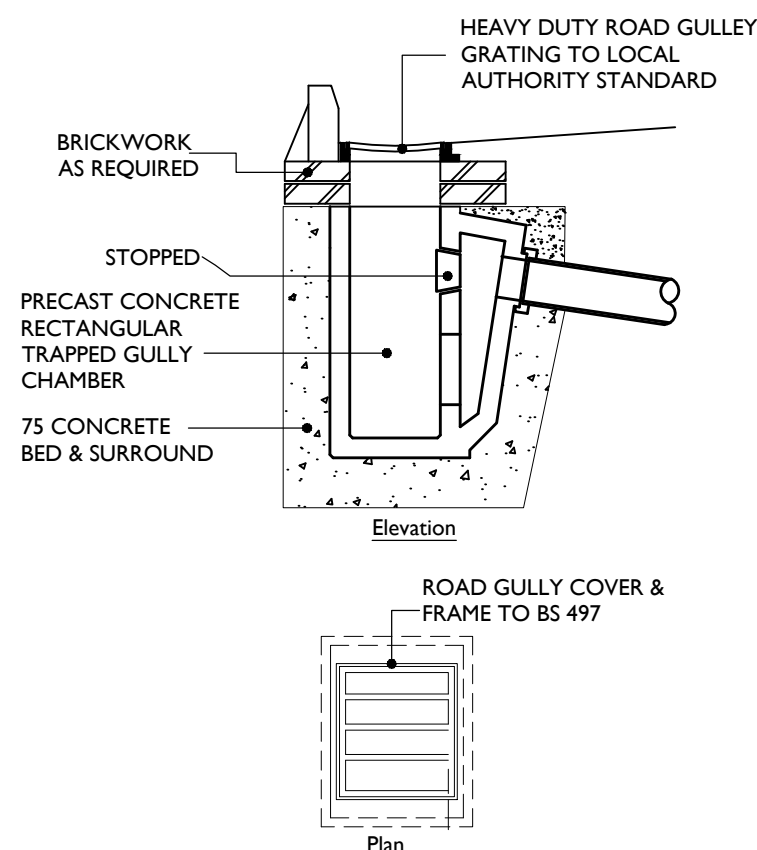
Email: info@www.mkoireland.ie/Website: www.mkoireland.ie

ISO A1 894mm x 841mm

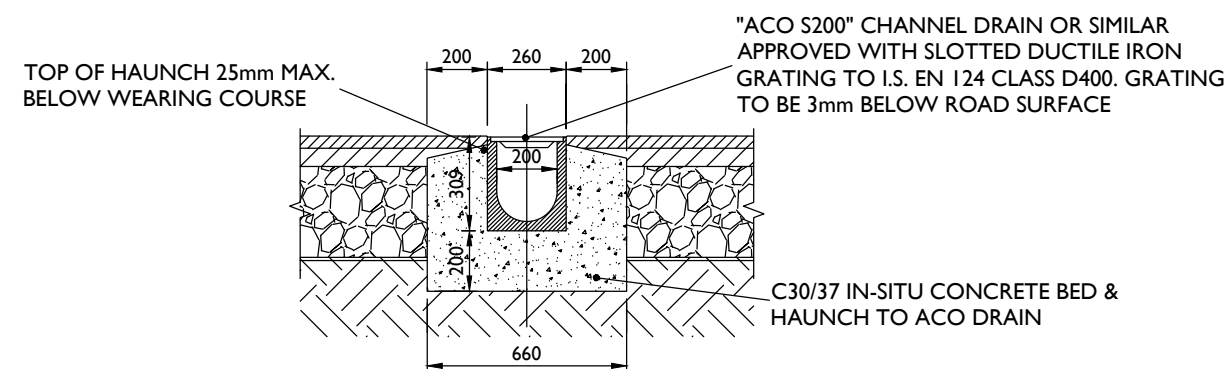
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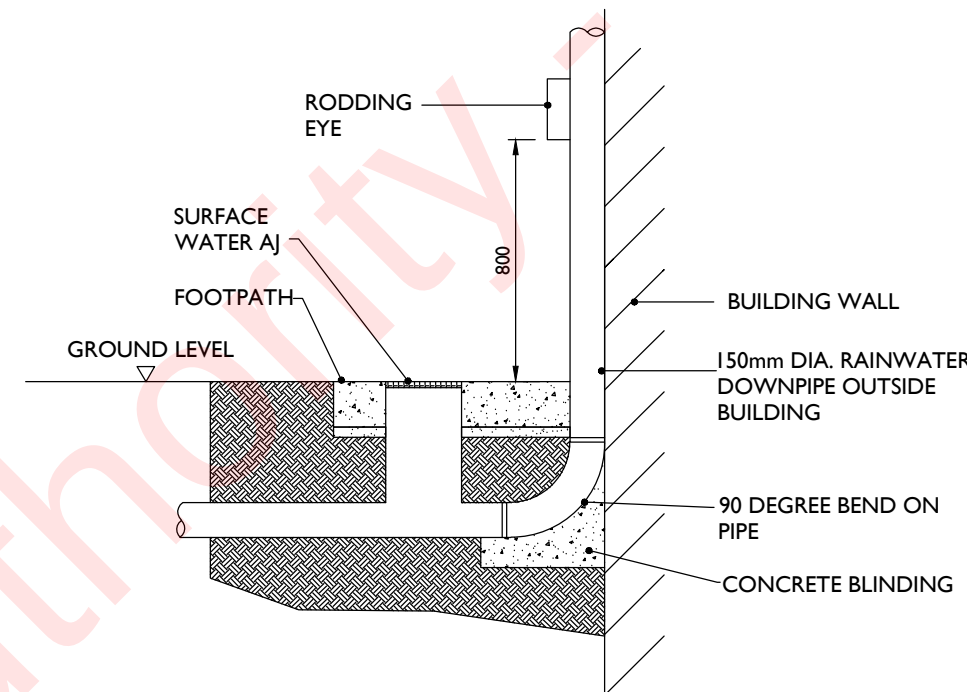
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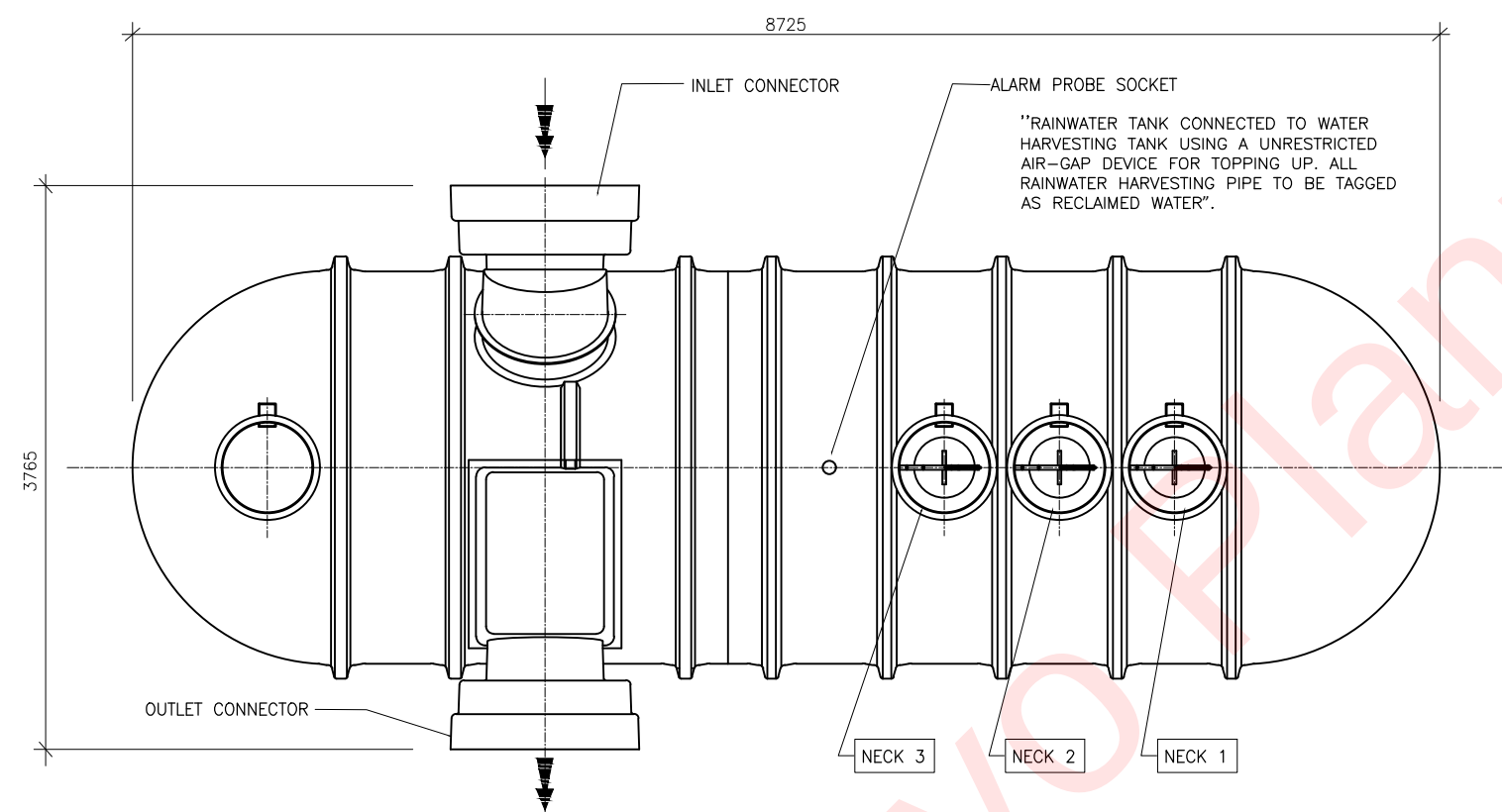
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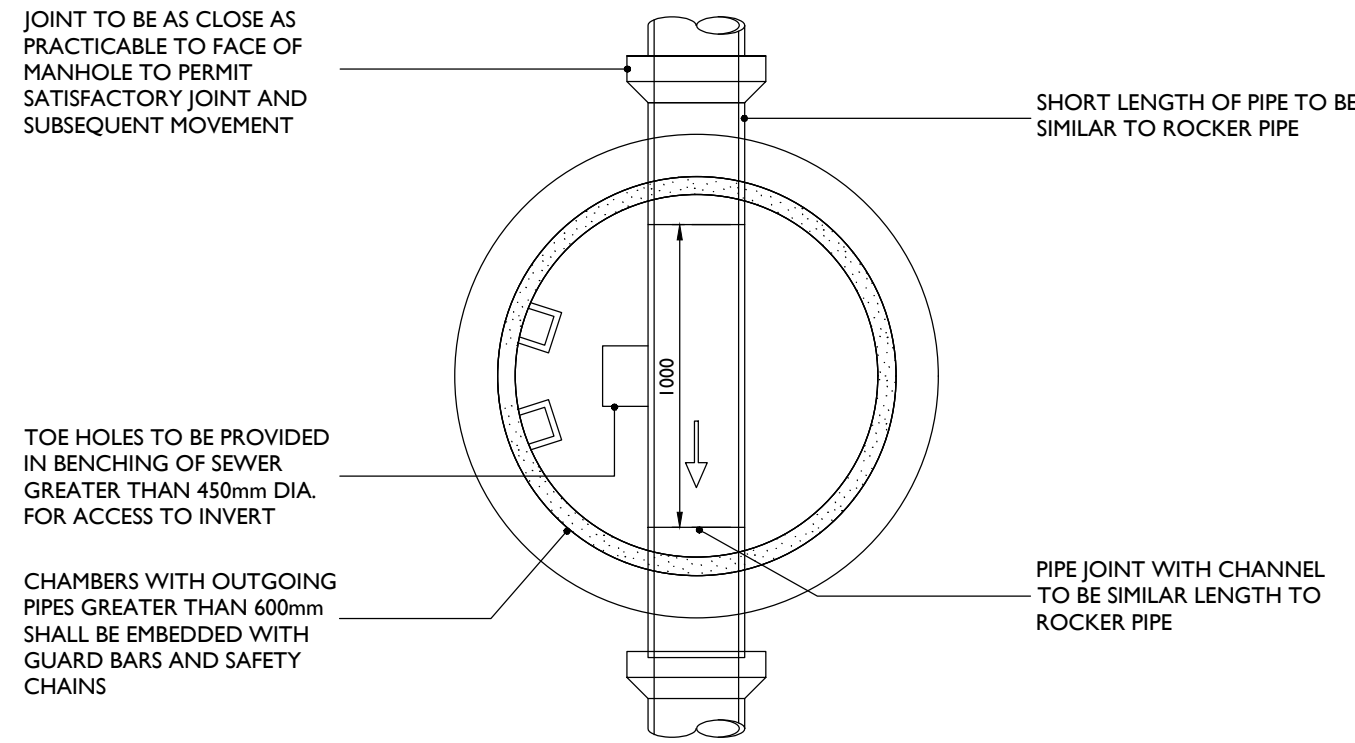
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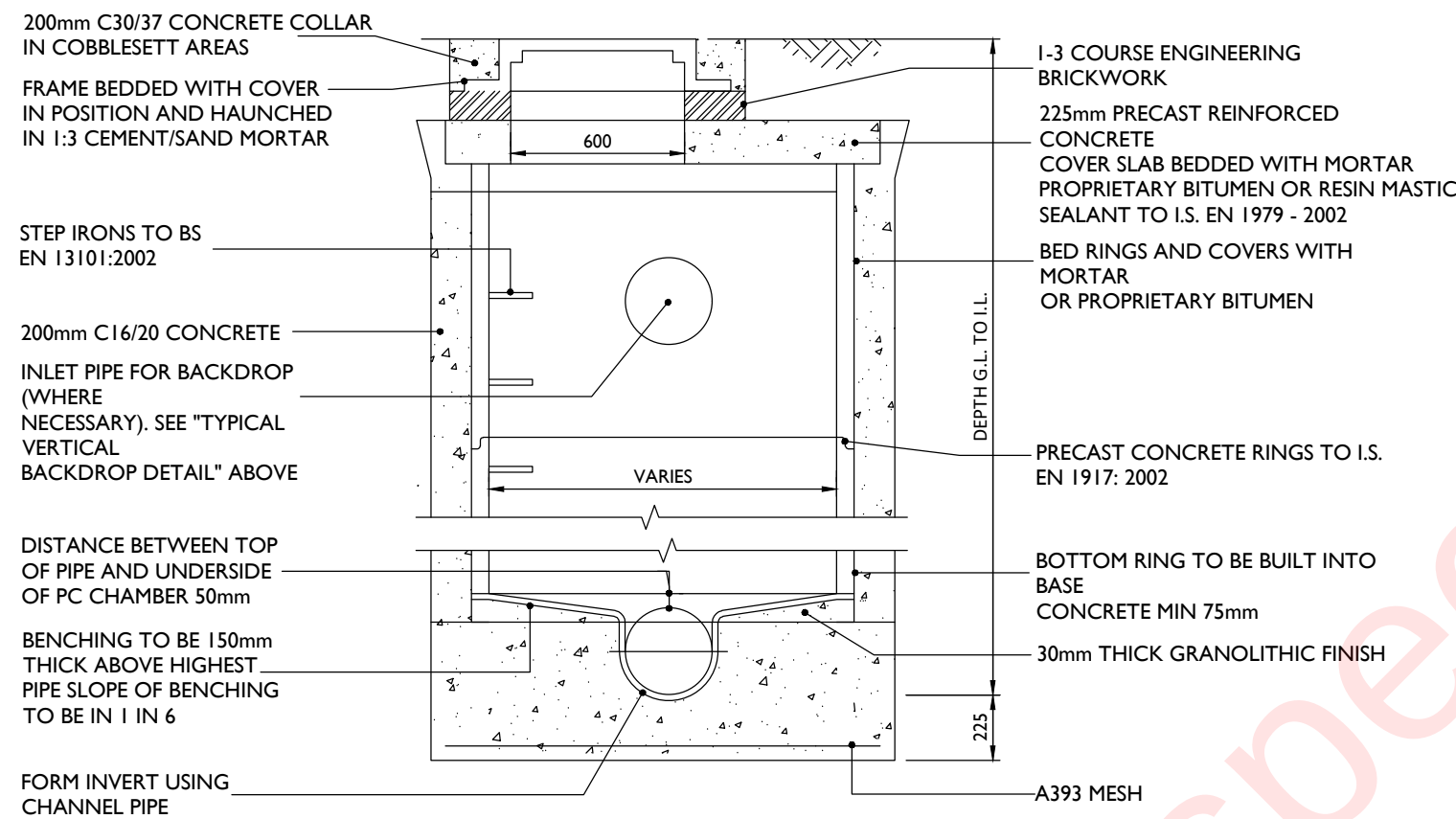
RAINWATER DOWNPIPE DETAIL
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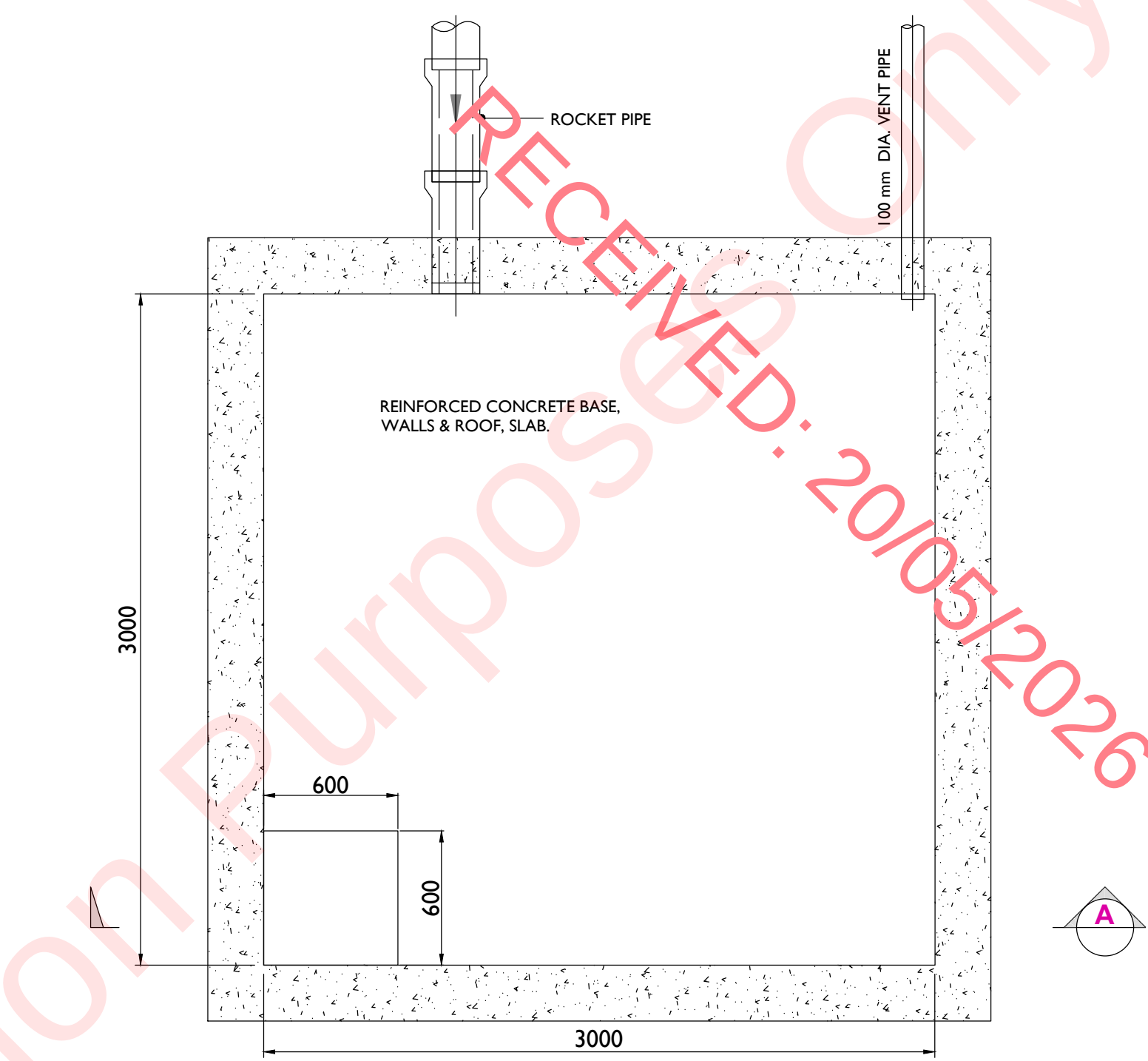
STANDARD RAINWATER HARVESTING TANK - PLAN
SCALE 1:50



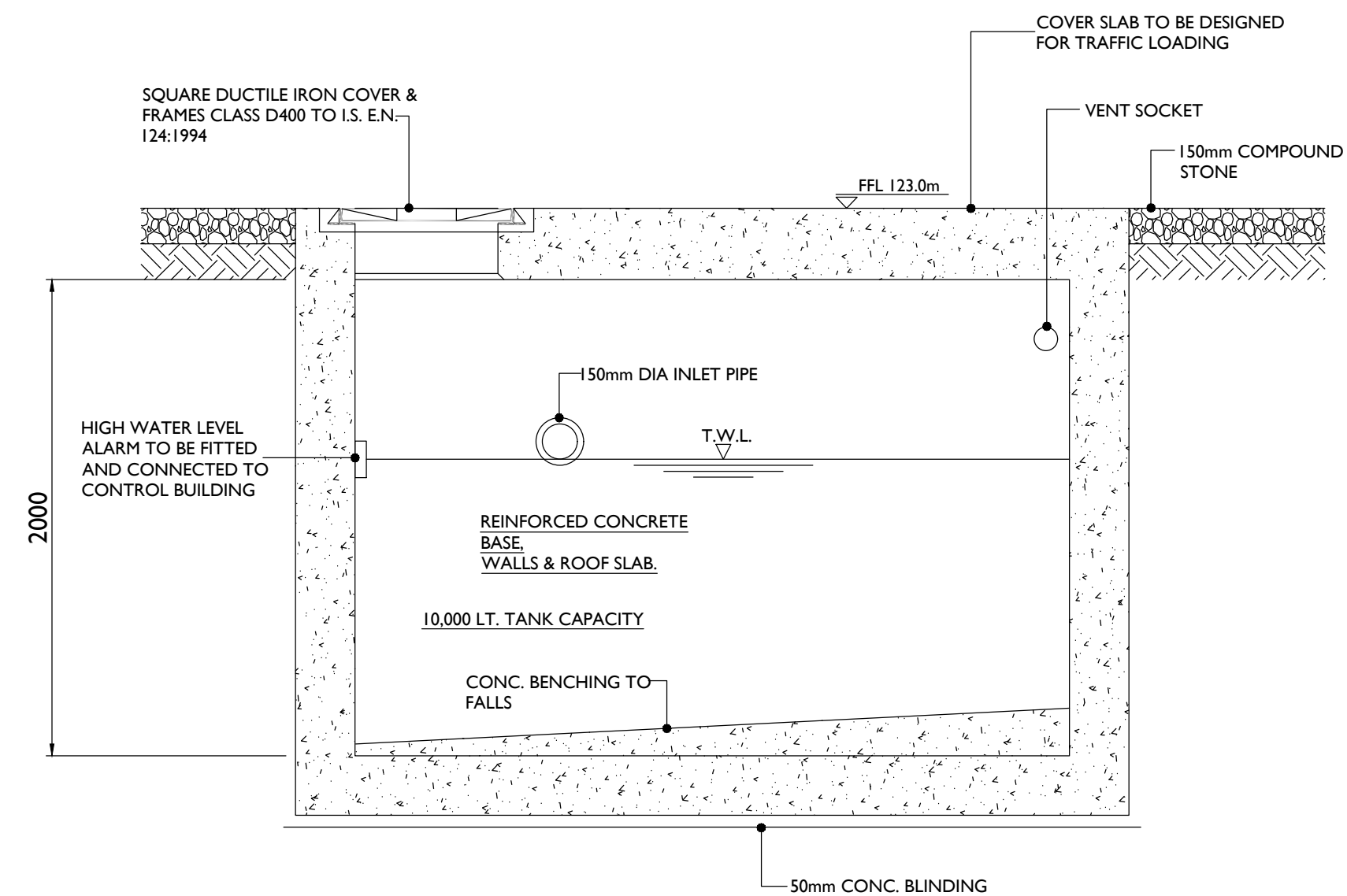
PRECAST RING MANHOLE - PLAN
SCALE 1:25



PRECAST RING MANHOLE - SECTION
SCALE 1:25



STANDARD FOUL WATER HOLDING TANK - ELEVATION
SCALE 1:25



STANDARD FOUL WATER HOLDING TANK - SECTION A-A
SCALE 1:25

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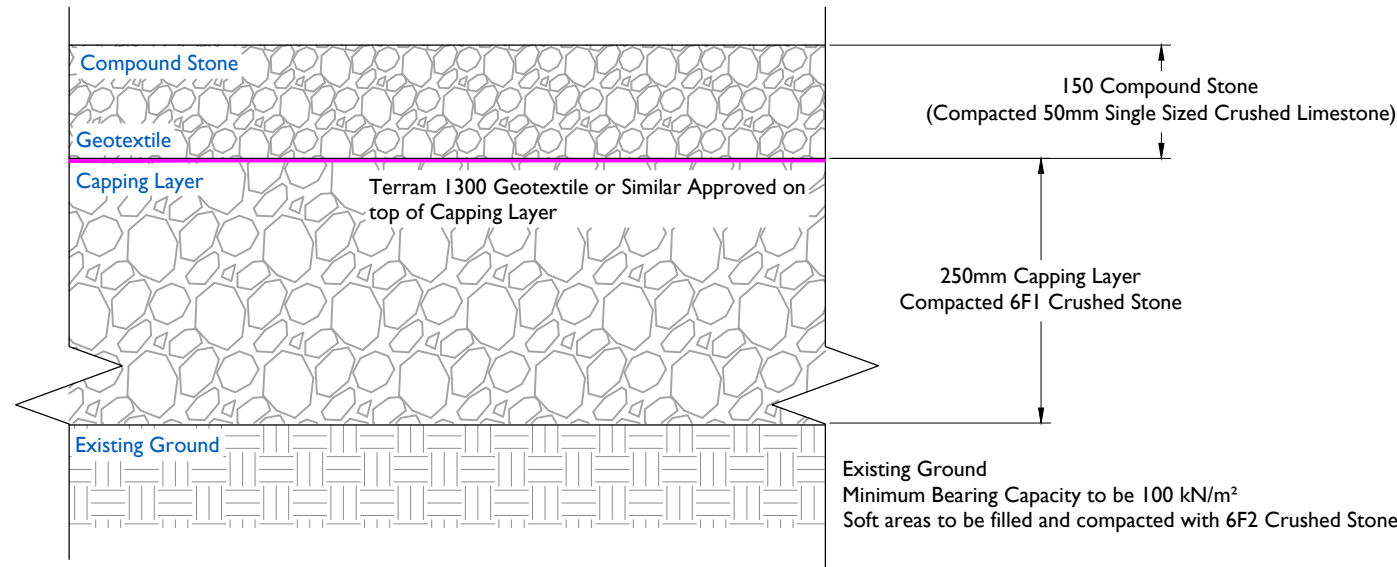
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SHEET NUMBER

05981-DR-106

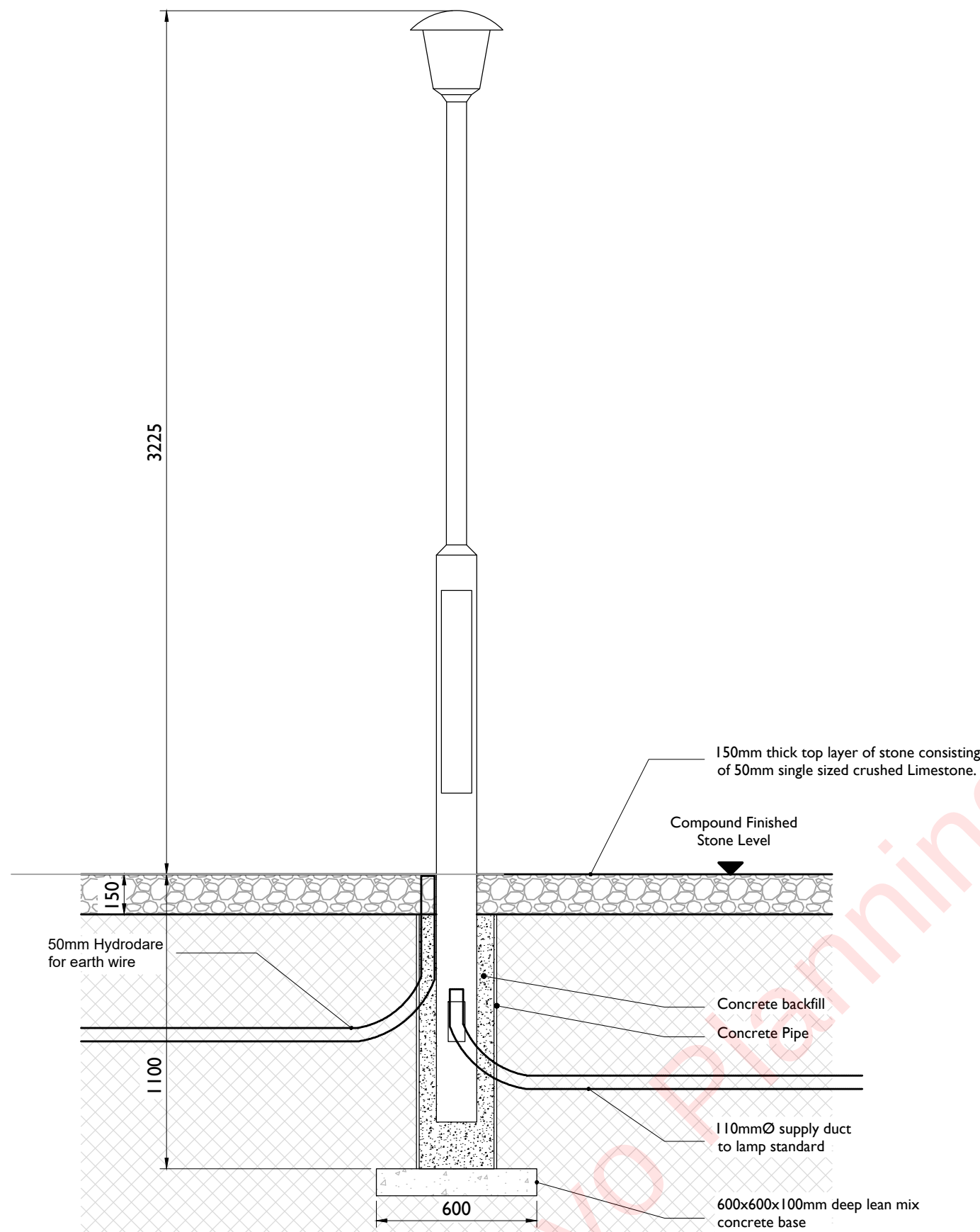
ISO A2 420mm x 594mm

Project Management Initials: Designer: GD Checked: KC Approved: GH



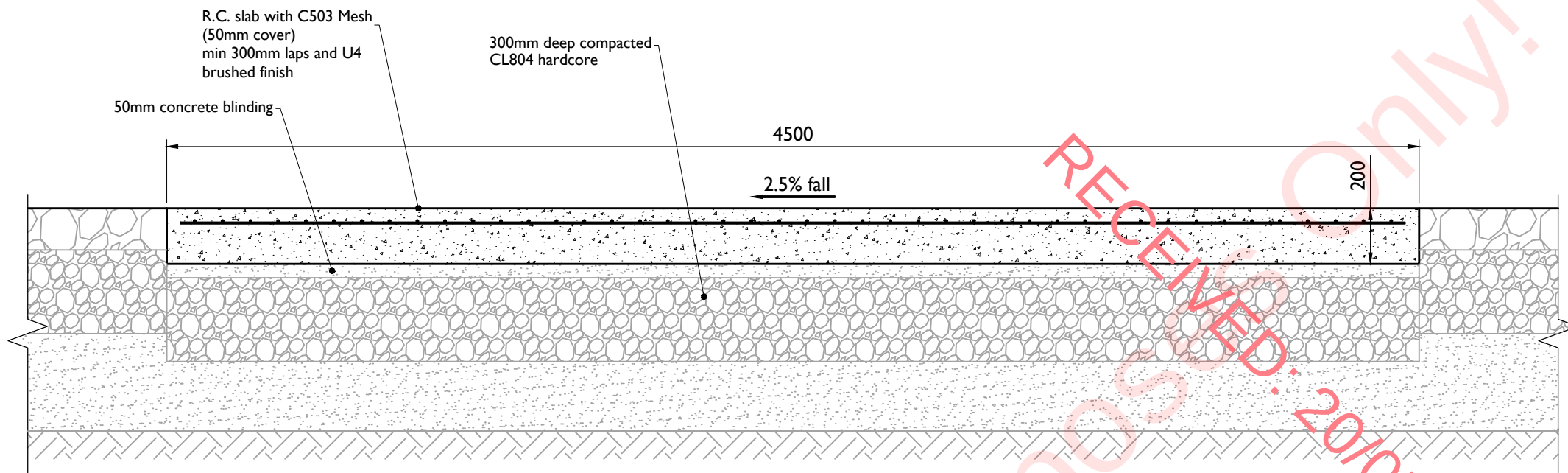
STANDARD COMPOUND DETAIL

SCALE 1:10



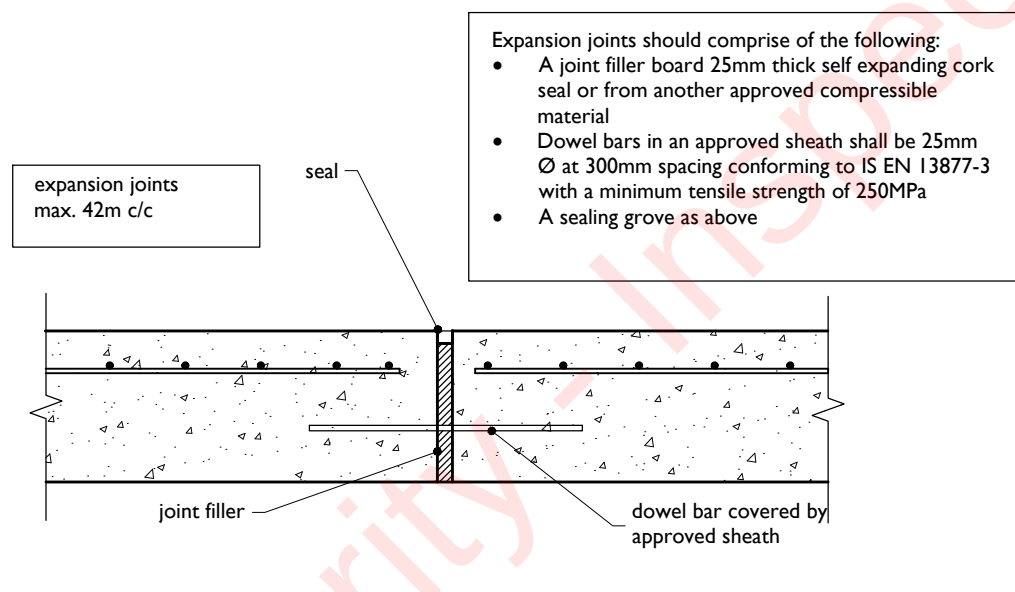
LIGHTING COLUMN & SURROUND DETAIL

SCALE 1:20



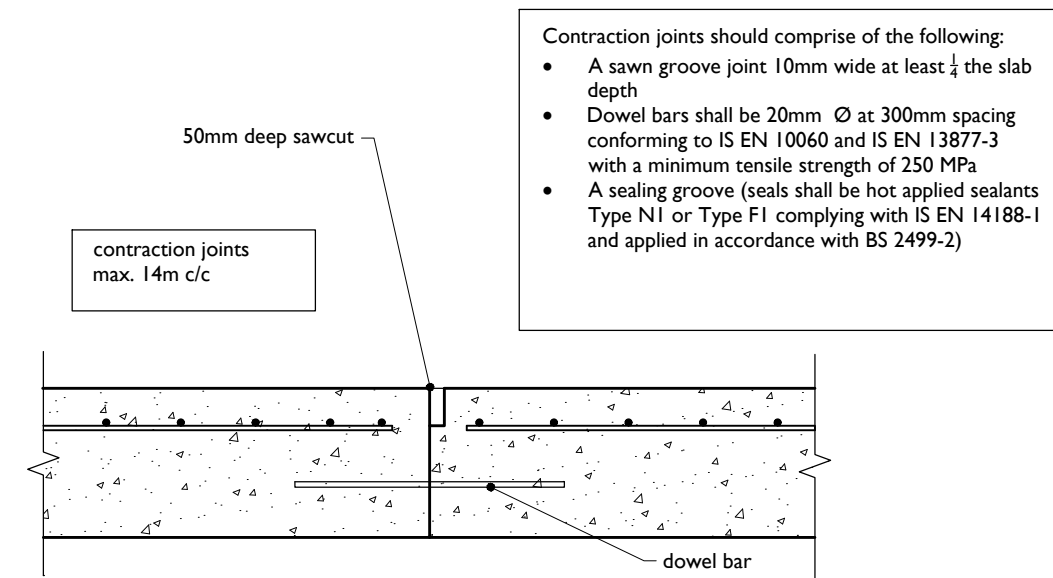
STANDARD SECTION - CONCRETE ACCESS ROAD

SCALE 1:20



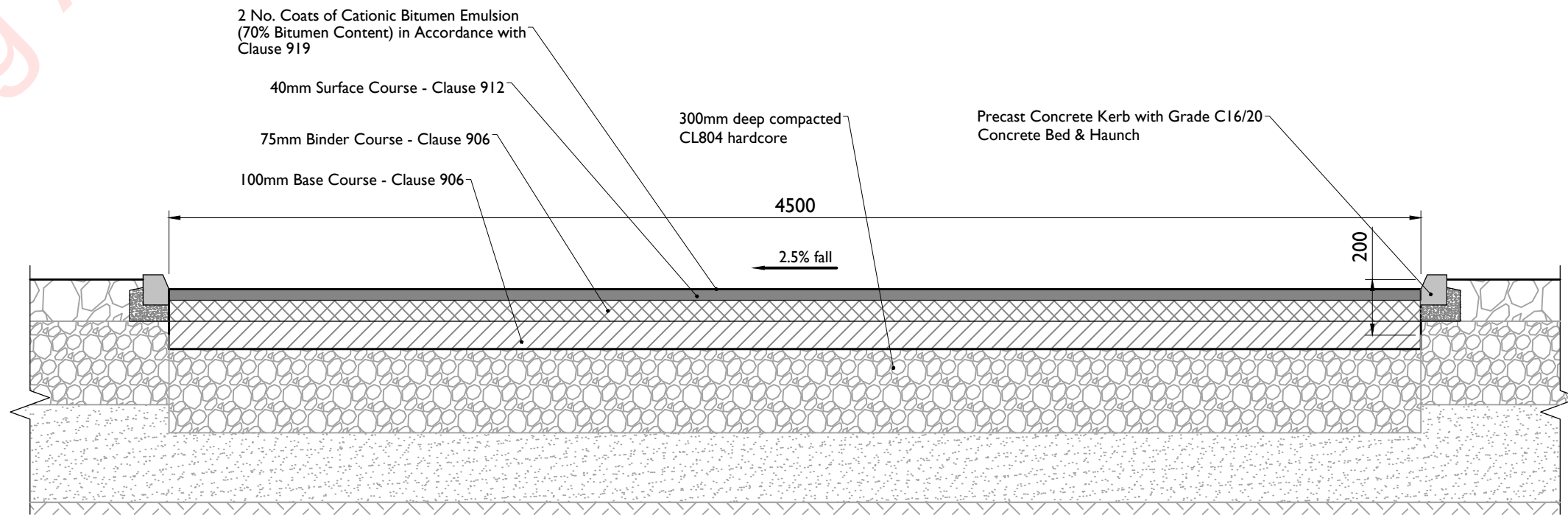
Concrete Access Road Expansion Joint

SCALE 1:10



Concrete Access Road Contraction Joint

SCALE 1:10



STANDARD SECTION - ASPHALT ACCESS ROAD

SCALE 1:20



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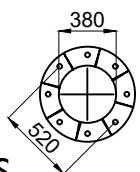
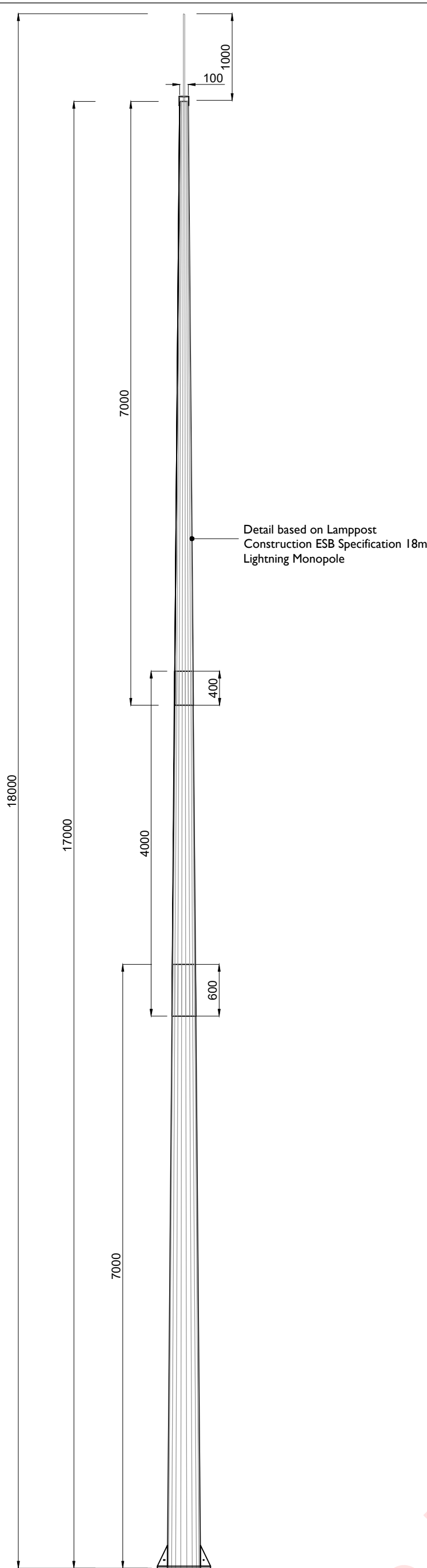
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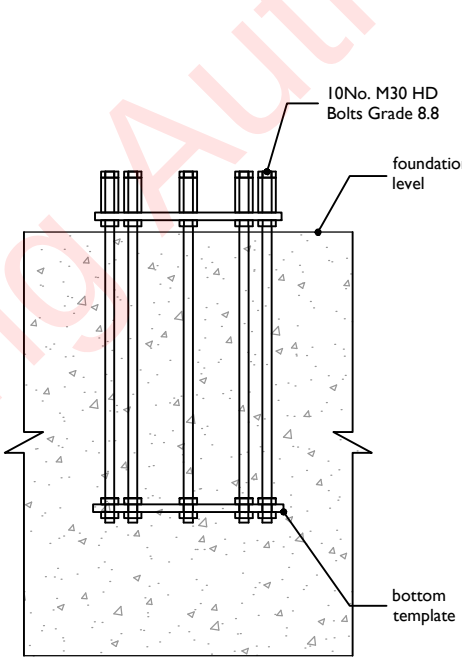
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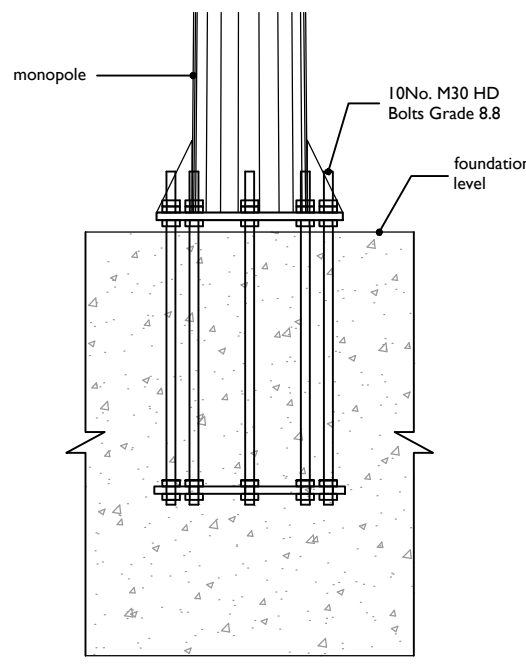
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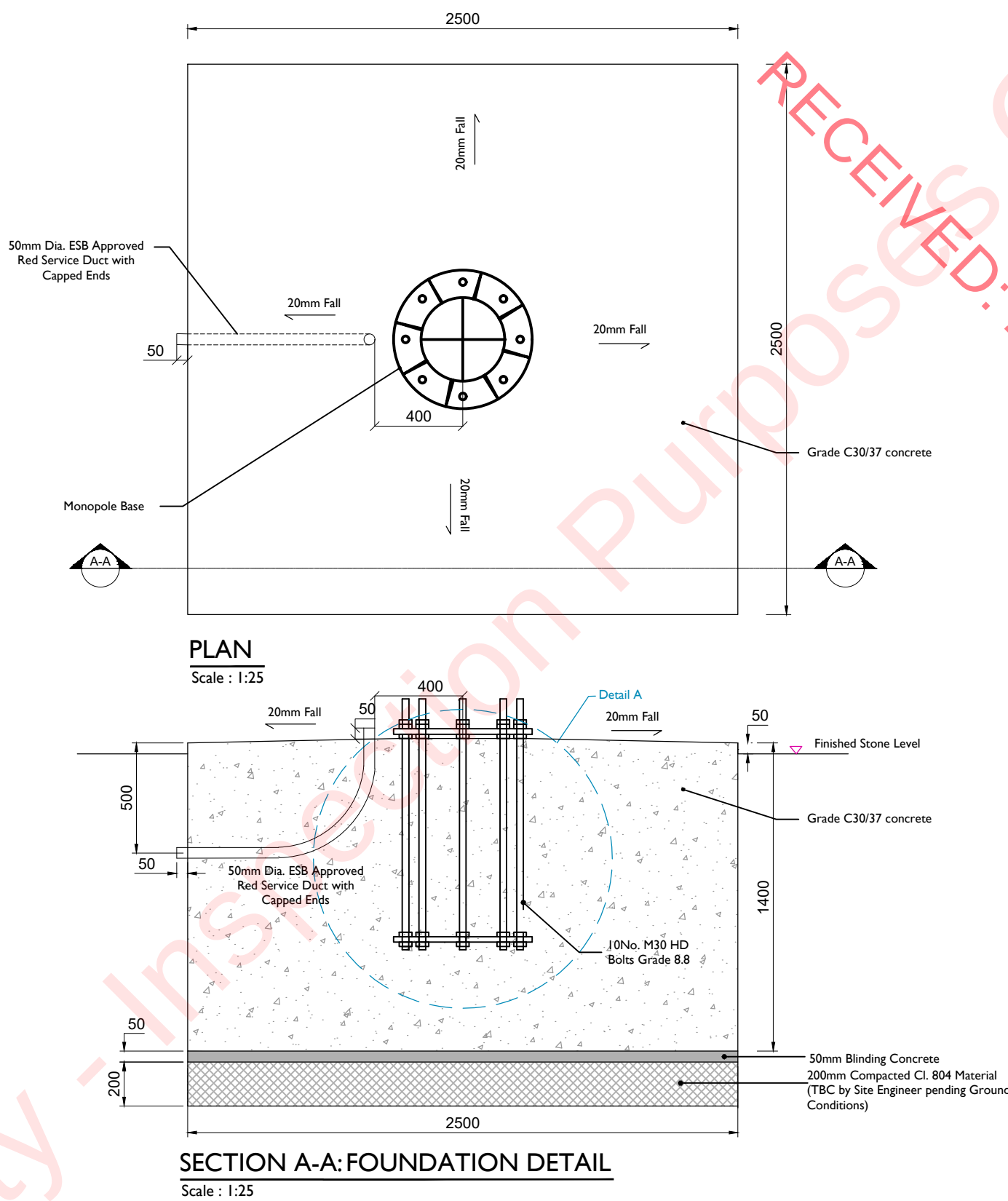
MONOPOLE DETAILS
Scale : 1:50



DETAIL A
Scale : 1:25



MONOPOLE BASE PLATE TO HDB CONNECTION
Scale : 1:25



GENERAL NOTES:

1. ALL drawings to be read in conjunction with the Specification and all Engineers and Architects Drawings.
2. All concrete to be in accordance with I.S. EN 206-1:2002 with the Mix Designs shown in Table I
3. Concrete finishes to be in accordance with Table 6.1 of the ESB Specification CS17-SO1-005.
4. ALL Reinforcement shall be in accordance with BS4449 and scheduled in accordance with BS.8666. 300mm Laps for A142 Mesh 600mm Min Laps for A393 Mesh.
5. Refer always to relevant Earth Grid drawing prior to excavations & concrete pours.
6. Geometrical tolerances to be in accordance with Table 6.2 of ESB Specification CS17-SO1-005

FOUNDATION NOTES:

7. Ground to have a minimum Bearing Capacity of 100 kN/m².
8. Formation level and Foundations to be inspected and approved by the Engineer prior to any Concrete being poured.
9. All Foundations are to be blinded immediately after excavation with 50mm of C16/20 Concrete Blinding.
10. Refer always to the relevant Earth Work Drawings prior to Excavations & Concrete pours.

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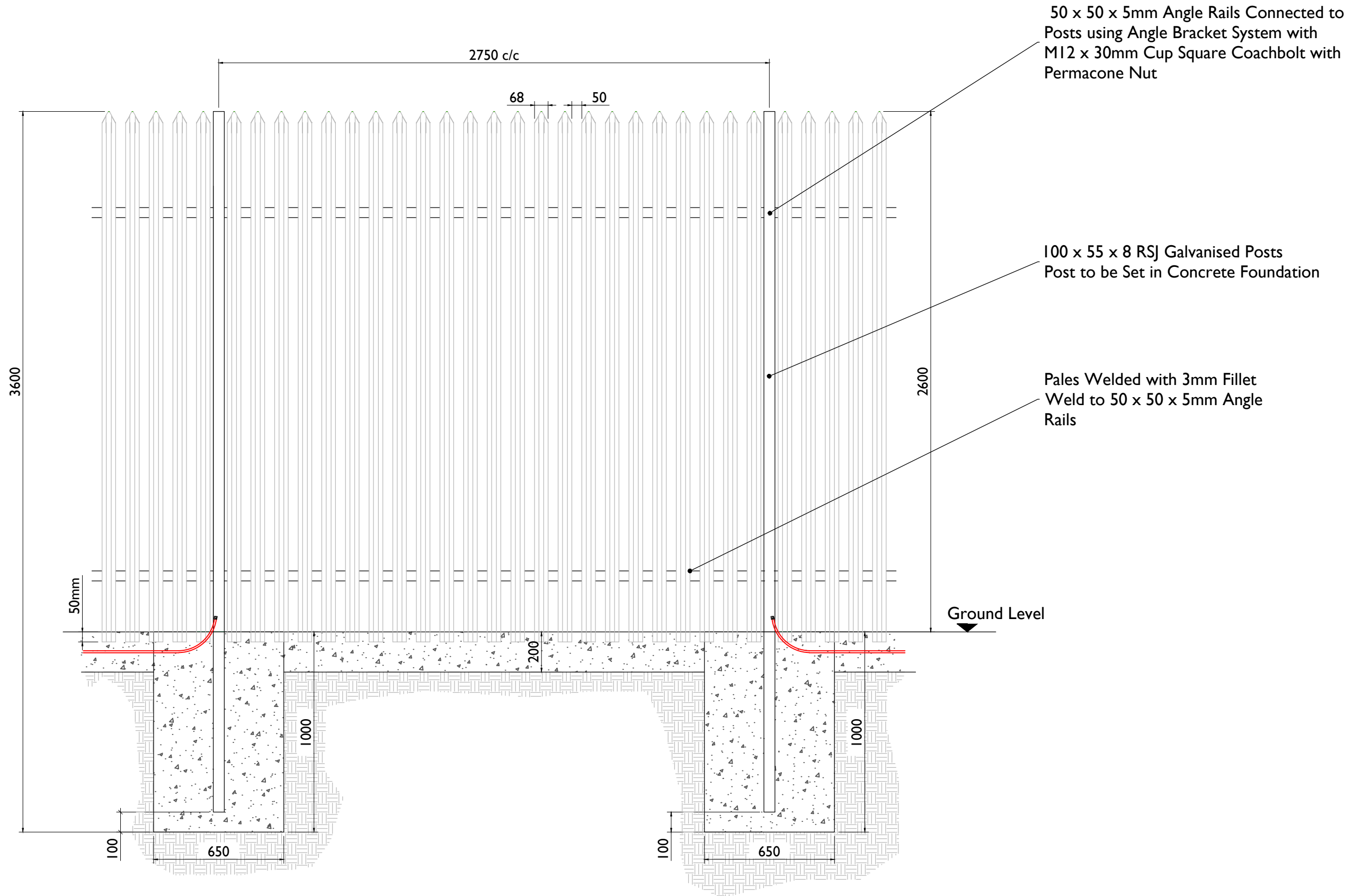
Monopole Lightning Mast Details -18m

SHEET NUMBER

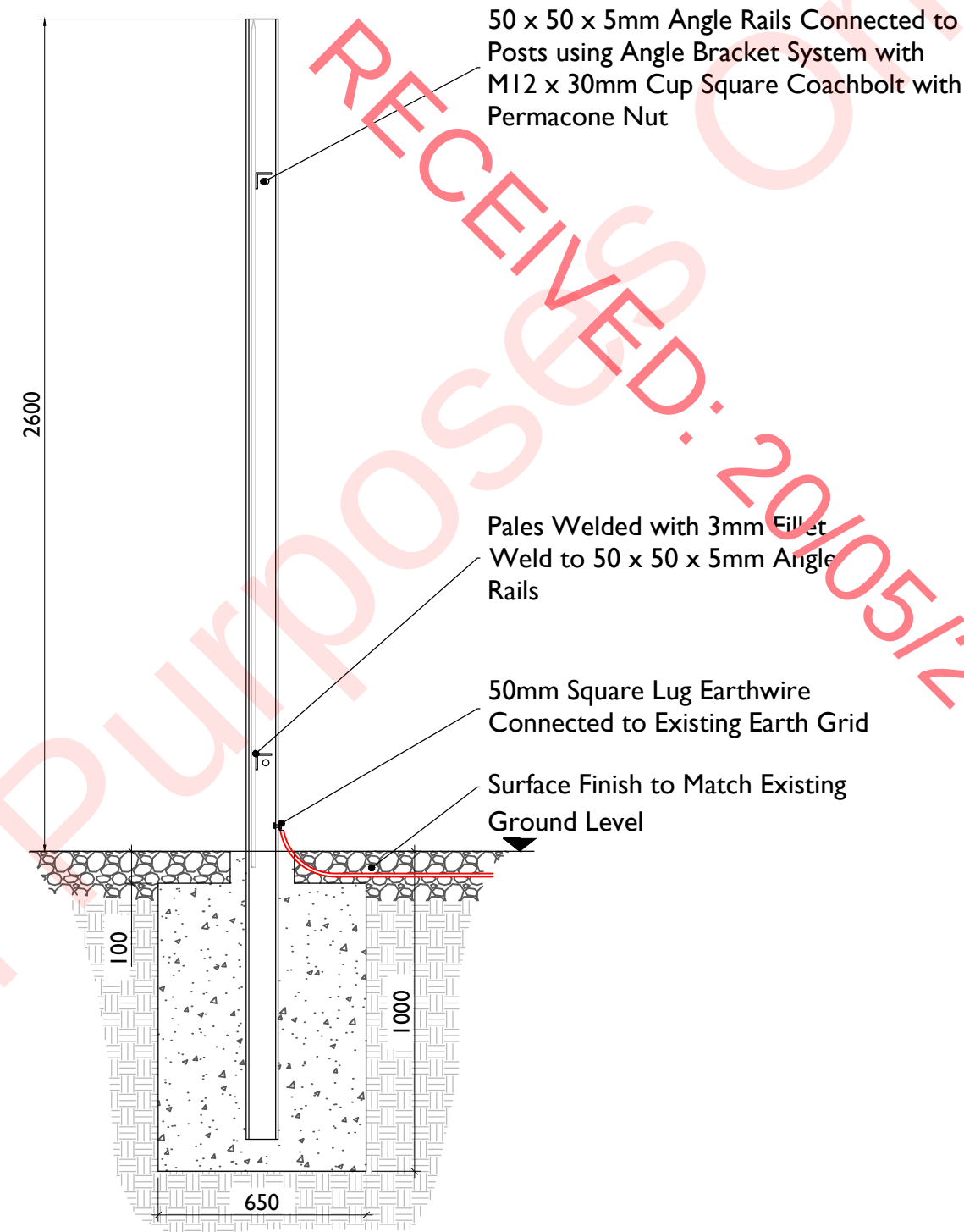
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ISO A1 594mm x 841mm

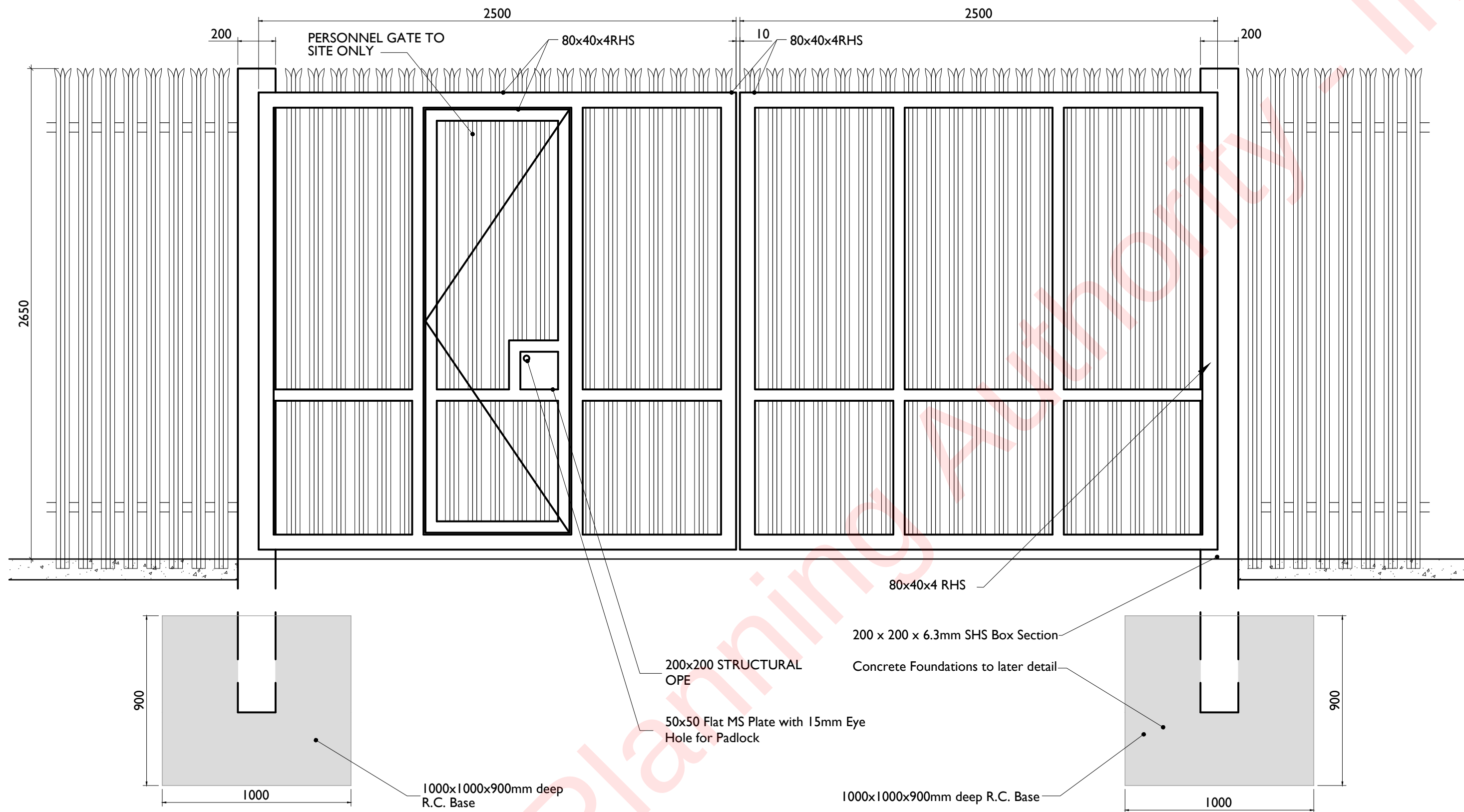
Project Management Initials: Designer: CH Checked: GD Approved: RG



PALISADE FENCING DETAILS - ELEVATION
SCALE 1:20



PALISADE FENCING DETAILS - SECTION
SCALE 1:20



PALISADE FENCING DETAILS - ELEVATION
SCALE 1:20

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- NOTES: -
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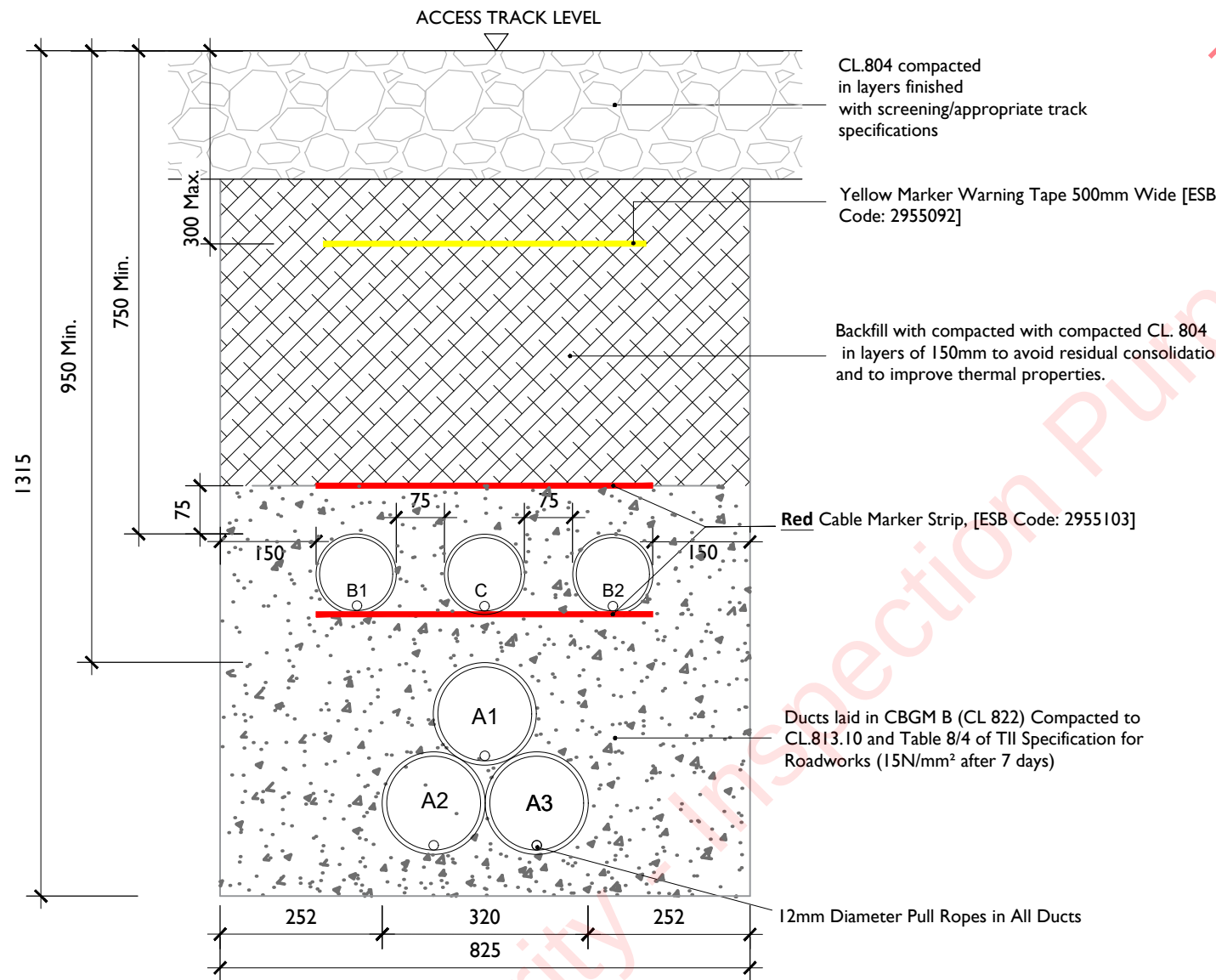
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SHEET TITLE

Palisade Gate and Fencing Details

SHEET NUMBER

05981-DR-109



A = 160mm: Outer Diameter HDPE ESB Approved Duct, SDR= 21.0 (Power) [ESB Code: 9317560]
B = 125mm: Outer Diameter HDPE ESB Approved Duct, SDR=17.6 (Comms) [ESB Code: 9317552]
C = 125mm: Outer Diameter HDPE ESB Approved Duct, SDR=17.6 (ECC) [ESB Code: 9317552]

110kV Ducting Section Through Access Track
SCALE 1:10

- Note:**
- This drawing is subject to ESB design approval and should not be used for construction.
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**ALL REINSTATEMENT WORKS ARE TO BE IN ACCORDANCE
WITH ACCESS TRACK DESIGN REQUIREMENTS**

Reinstatement details based on Guidelines for Managing Openings in Public Roads - SD14



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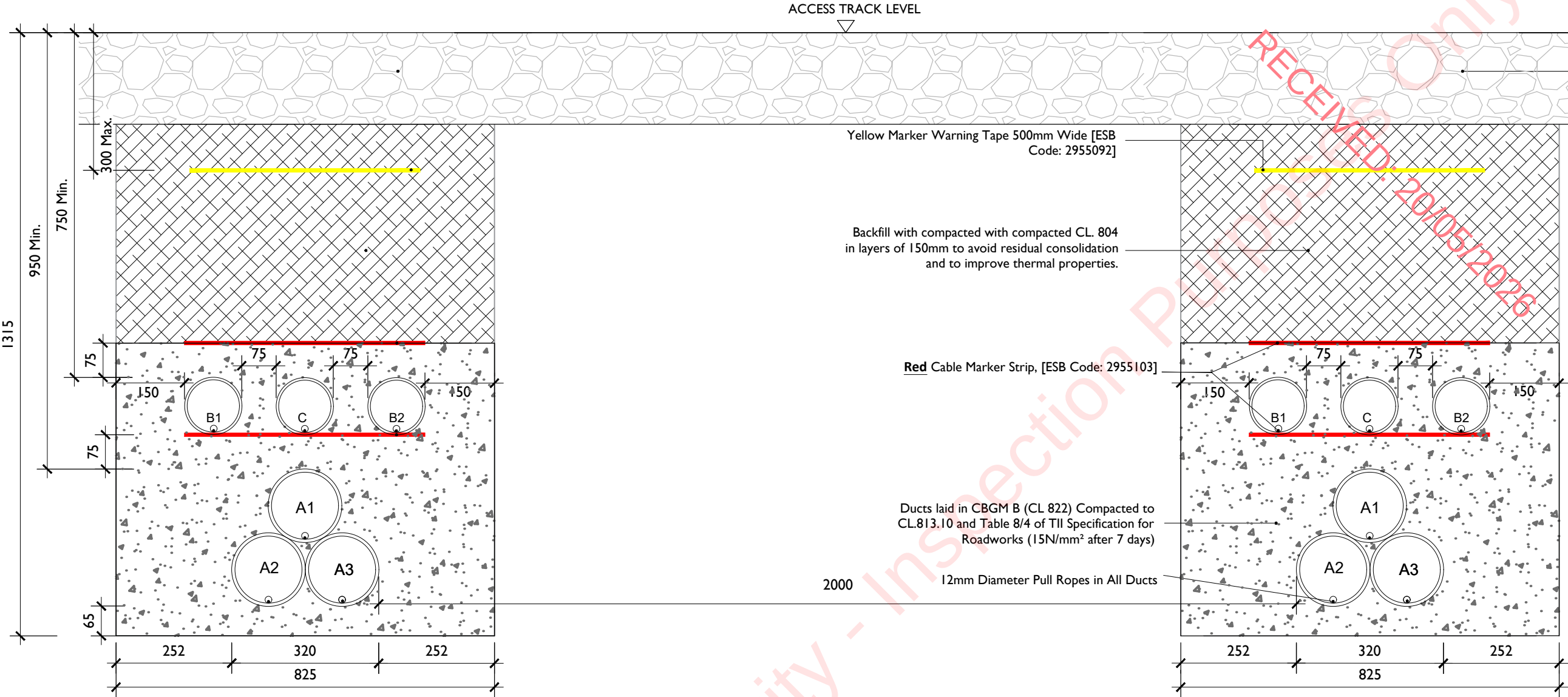


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Energy Project
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SHEET NUMBER
05981-DR-110

SHEET TITLE
**110kV Single Ducting Section
Through Access Track**
DRAWING STATUS
For Planning

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B = 125mm: Outer Diameter HDPE ESB Approved Duct, SDR=17.6 (Comms) [ESB Code: 9317552]
C = 125mm: Outer Diameter HDPE ESB Approved Duct, SDR=17.6 (ECC) [ESB Code: 9317552]

110kV Double Circuit Ducting Section Through Access Track

SCALE 1:10

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SHEET NUMBER
05981-DR-111

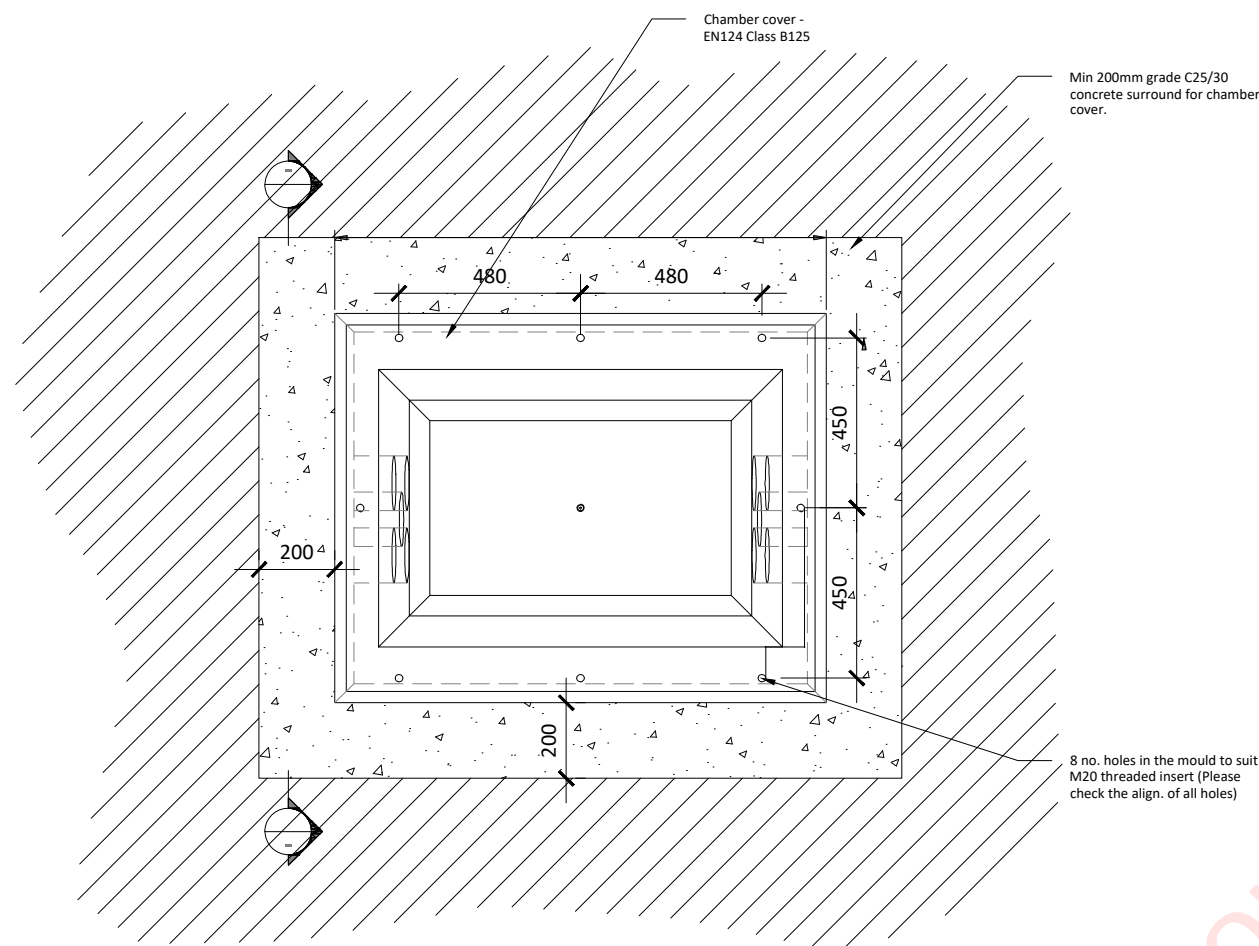
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110kV Double Circuit Ducting Section
Through Access Track

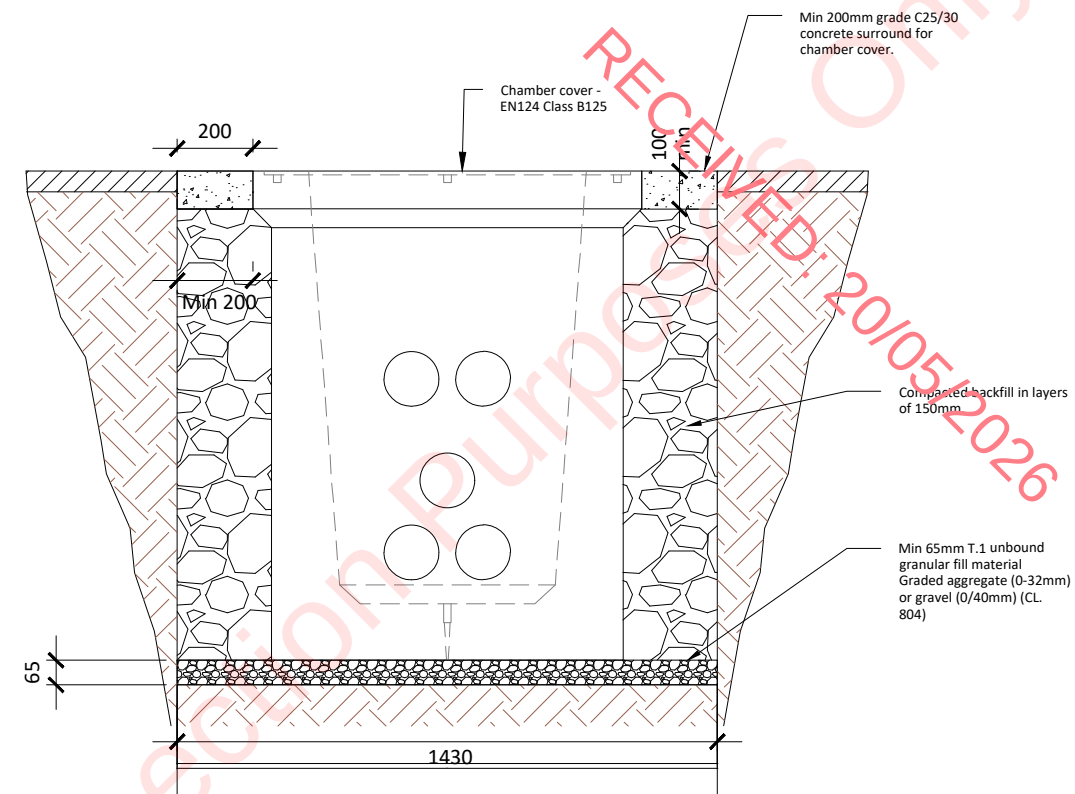
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For Planning

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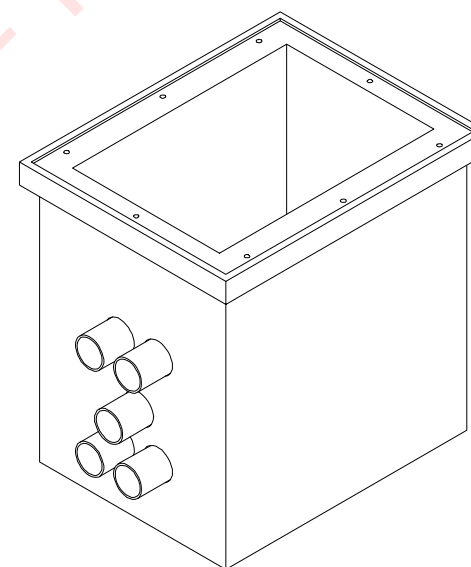
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Standard Plan of C2 Chamber
SCALE 1:20



C2 Chamber Detail - Section A
SCALE 1:20



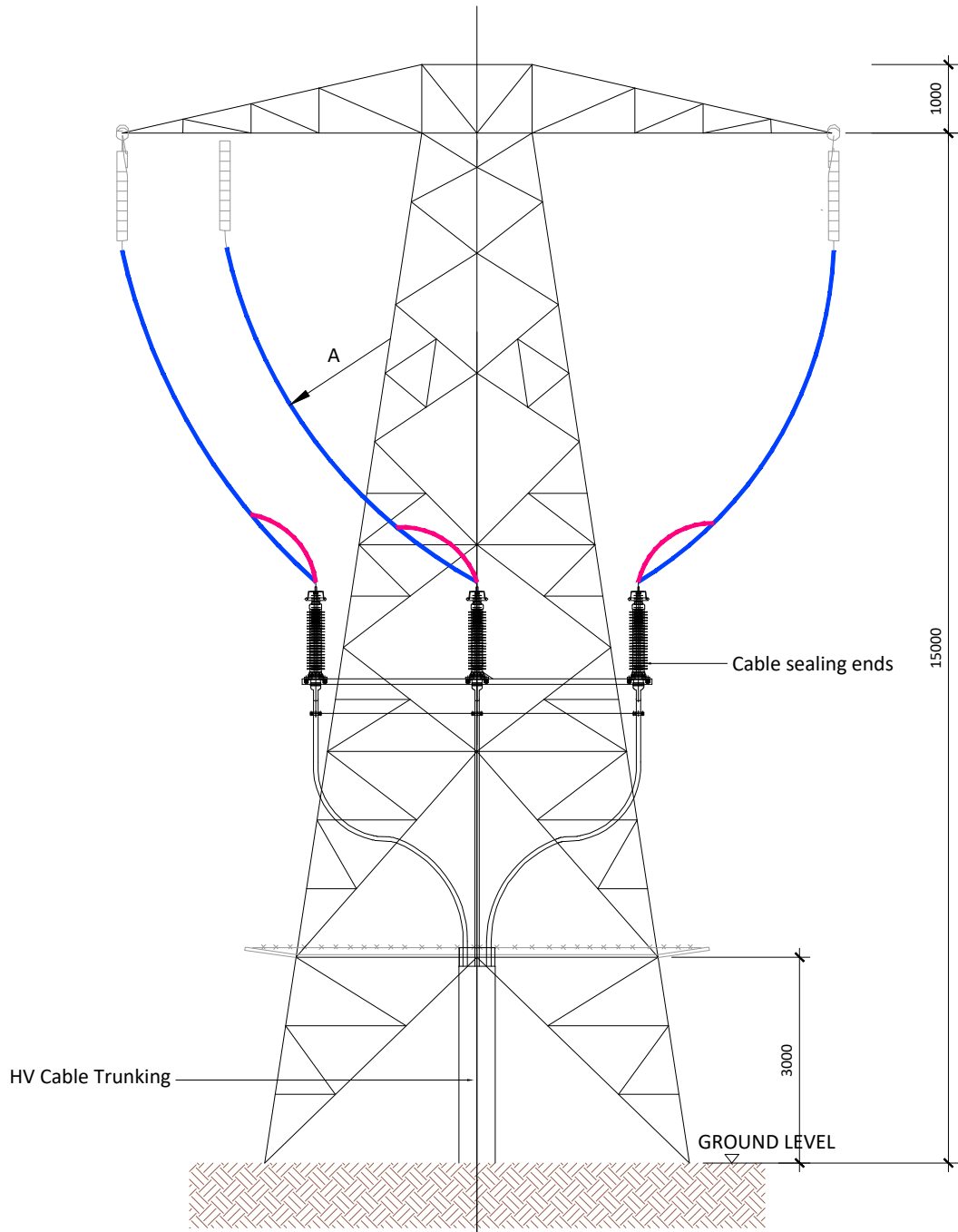
Isometric : C2 Chamber Arrangement
SCALE 1:20

NOTES:

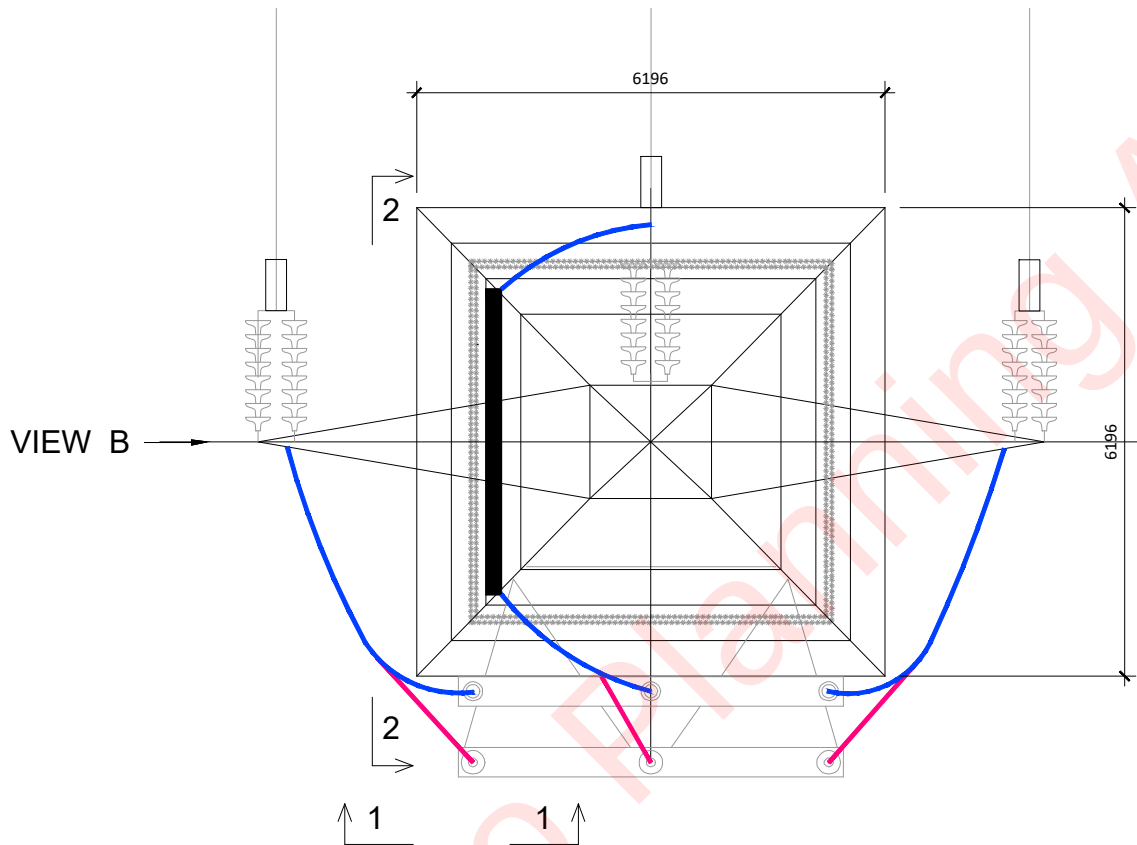
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- All dimensions in millimetres
- Reinstatement to comply with requirements of the relevant local authority / asset owner
- Final position of C2 Chambers shall be agreed with EirGrid.

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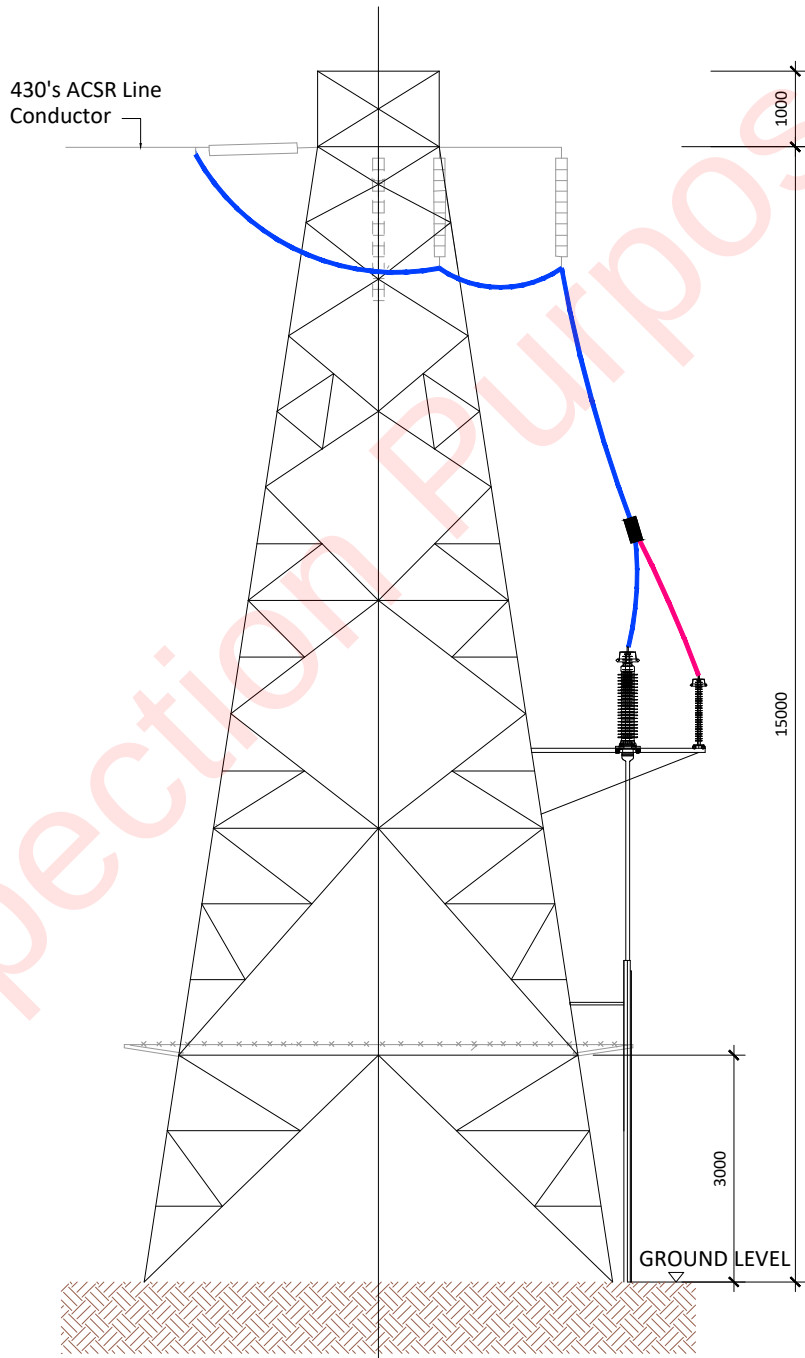
* Please note that Conductors are not shown for clarity of Structure display.



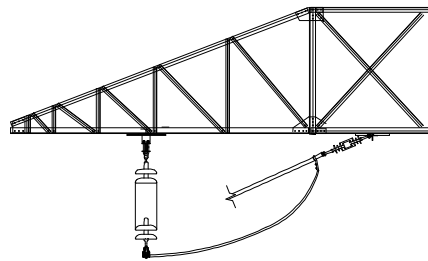
FRONT ELEVATION
(Rear Platform Removed for Clarity)
Scale: 1: 100



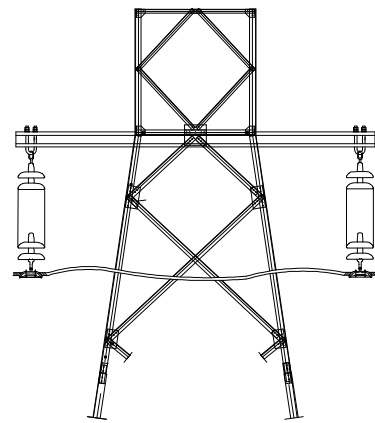
PLAN VIEW
Scale: 1: 100



SIDE ELEVATION
Scale: 1: 100



ELEVATION 1-1
Scale: NTS



ELEVATION 2-2
Scale: NTS



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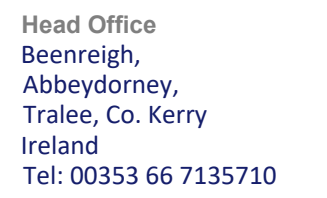
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SHEET TITLE

110kV End Mast
(Type 1493ET)

SHEET NUMBER

05981-DR-113



Cunlaghfadda Green Energy Project



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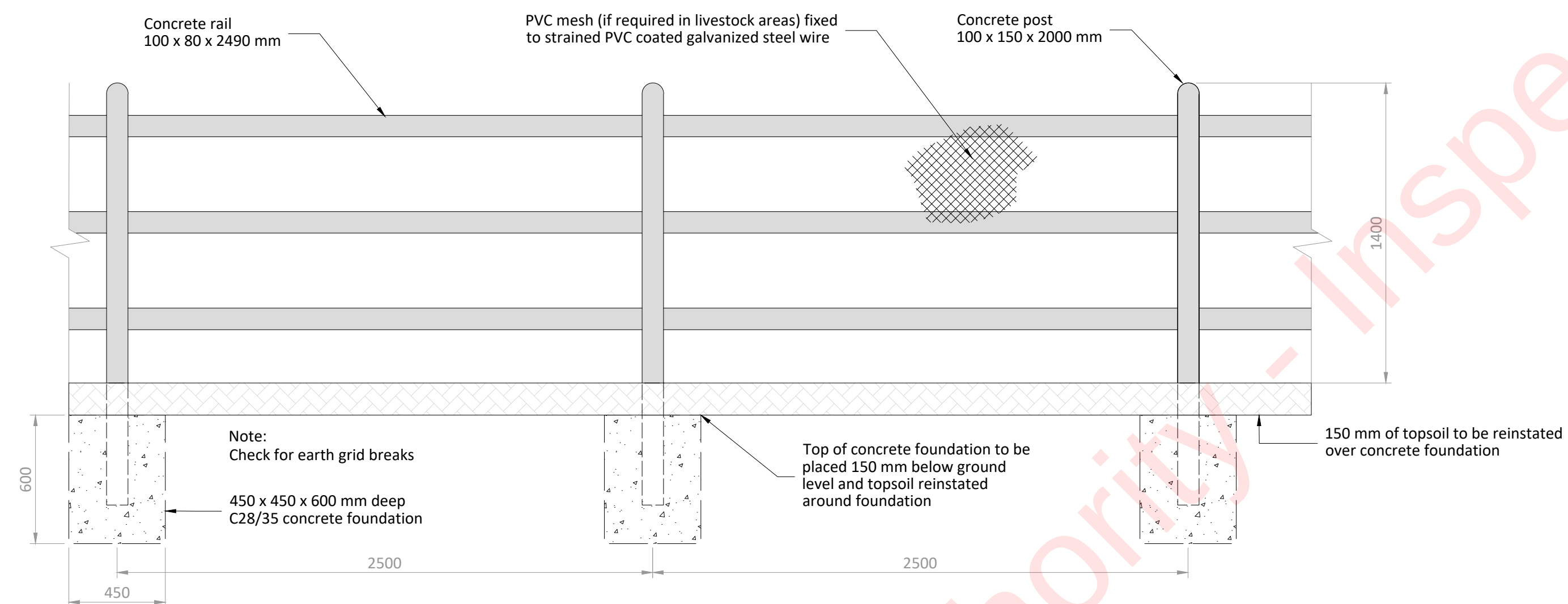
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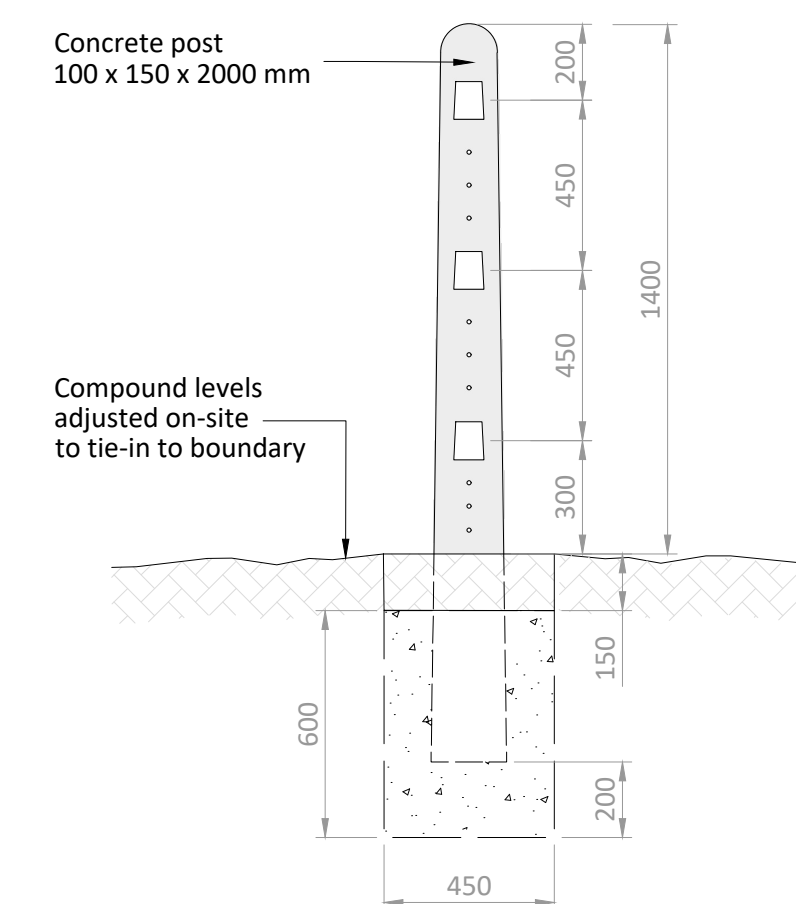
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Concrete Post & Rail Fence Details

05981-DR-116



External Elevation of Concrete Post & Rail Boundary Fencing



Section View
Scale:1:20

Outline Construction Methodology



Cunlaghfadda 110kV Loop In Grid Connection



Date: 07th May 2026

Report Ref: 05981-R03-05



Revision:	Author:	Checked:	Date:	Notes:
00	AC	ER	13/02/2024	Issued to Client for Comment
01	AC	ER	20/06/2025	Issued for Planning
02	AH	ER	09/01/2026	Issued for Planning
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04	ER	AC	17/04/2026	Issued for Planning
05	ER	AC	07/05/2026	Issued for Planning

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1.0 Introduction

TLI Group (“the Consultant”) were engaged by Cunlaghfadda Green Energy Ltd (“the Client”) to identify and analyse potential 110kV loop in options available for the Cunlaghfadda Green Energy Project, which will loop in to the existing Cloon – Castlebar 110kV line. This project will have an estimated Maximum Export Capacity (MEC) of 31.5 MW.

The 110kV grid connection will consist of constructing two end masts and a new standard EirGrid loop in substation. The Cunlaghfadda substation will be connected via two 110kV UGC circuits to the two end masts structures that will intersect with the existing Cloon – Castlebar 110kV overhead line. The OHL works will consist of the installation of two end masts and terminating the existing phase conductors on those end masts.

This document is intended to be used as an aid to understand the methodologies to be employed during construction and should be read in conjunction with all other specialist reports which accompany the planning application. Also, this document is in outline form only and will be revised and updated before the commencement of any construction activities. For the purposes of the planning application, this document should be read in conjunction with Chapter 4 of the EIAR (Description of the Proposed Project), the Construction and Environmental Management Plan (CEMP), the Appropriate Assessment Screening Report (AASR), Natura Impact Statement (NIS), and all other supporting documents and EIAR chapters as relevant. The EIAR Site boundary can be seen below in Figure 1.

Figure 1: EIAR Site Boundary

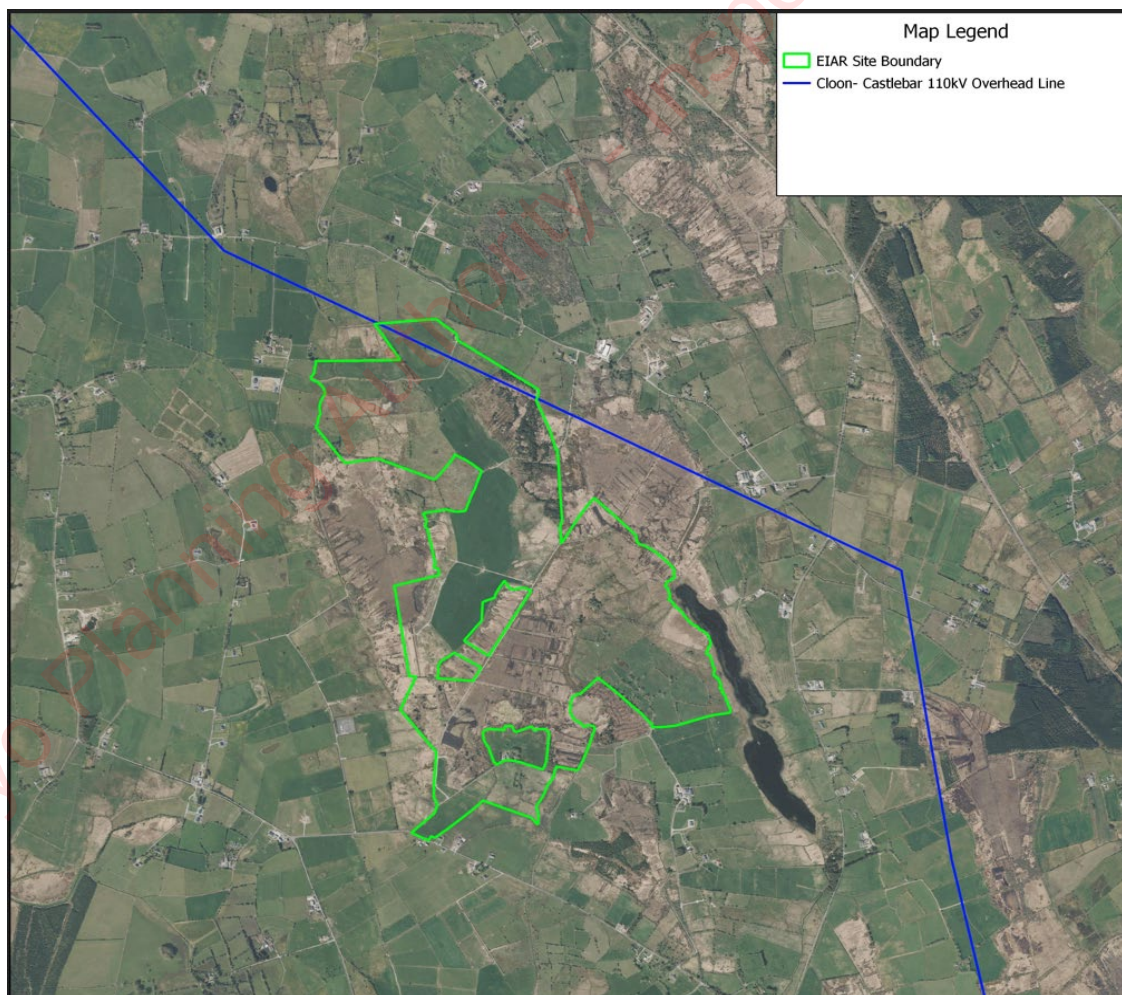


Table 1: Summary of OHL works

Table 1 - Summary of Grid Connection 110kV Design Route	
Section	Description (all lengths are approximate and to be confirmed at detailed design stage)
Section 1 UGC	Installation of 2 Steel line Cable Interface End masts Cunlaghfadda - Castlebar 110kV line UGC Circuit Length: 222.38m Cunlaghfadda - Cloon 110kV line UGC Circuit Length: 759.2m
Refer to Figure 1 and to the planning drawings submitted for location details. Note: The precise location of the proposed route within the planning application boundary is subject to change as result of existing services/utility locations, ground conditions and any environmental constraints.	

2.0 Preliminary Site Investigations

Trial pits or boreholes will be required at the location of each overhead line structure and the substation, which will be in addition to boreholes and trial pits undertaken to date.

2 boreholes or trial pits required at tower locations and along the access track to ascertain thermal resistivity of the soil.

At least 4 No. Boreholes are required at specified locations at the substation site location to ascertain ground composition and thermal/electrical resistivity of the soil.

Peat probing at the substation access track, substation compound.

Equipment:

- 4x4 vehicle
- Wheeled dumper
- Soil compactor
- 360° tracked excavator (wheeled excavator where required)
- Borehole Drill Equipment

3.0 Loop-In End masts

3.1 Existing 110kV OHL

The proposed Cunlaghfadda 110kV loop-in station will connect into the existing Cloon-Castlebar overhead transmission line. The existing line will be broken near the current Pole set structures, No. 102 and No. 105 forming the Cunlaghfadda- Cloon and Cunlaghfadda- Castlebar 110kV lines. Pole set 103, 104 and 105 are to be removed post construction.

The proposed design for the 110kV Loop-In from the existing OHL will require two new end masts, which will be constructed under the existing Cloon-Castlebar 110kV OHL. The existing OHL conductor will be terminated at these end masts connecting to the substation via underground cable.

Construction of foundations for end mast structures is anticipated to be approximately 7 days per end mast structure. It is anticipated that curing of concrete and erection of end masts will require 5 days per end mast, this being weather dependent. Stringing of conductors will be a 2-week process and final connection to the existing grid will be carried out by ESNB and at that point in time commissioning of the substation can start.

3.2 Steel End Mast Structures

The proposed end mast structure locations have been selected based on ground surveys, ground profiles, sight lines and ruling span checks.

The proposed construction scope will require the relevant personnel, machinery and materials which is as follows: -

<u>Equipment</u>	<u>Materials:</u>
• 5 operatives • 4x4 vehicle • Winch • Tractor and trailer • Crane • Teleporter • Chains / small tools • Tracked Excavator • Tracked Dumper	• Lattice steel end masts • Insulators • Electrical connections • Concrete (foundation) • Aggregate

The following section outlines the methodology to be followed during construction works of the new end mast structures.

1. End masts sites are scanned for underground services such as cables, water pipes etc. Consultation with the landowners and utility service providers will help to identify hazards and ensure there are no unidentified services in the area.
2. For each leg of the 2 No. End masts (8 legs in total) a foundation circa. 4m x 4m x 3m deep is required. To allow for safe construction the excavation will be stepped back which requires additional area to be excavated or shutter piles used if ground material is not suitable for benching. The formation levels (depths) will be checked by the onsite engineer. The excavated material will be temporarily stored close to the excavation and excess material will be used as berms along the site access tracks.

3. To aid construction, a concrete pipe is placed into each excavation to allow operatives level the end masts at the bottom of the excavation. The frame of the reinforcing bars will be prepared and strapped to a concrete pipe with spacers as required. The reinforcing bars will be lifted into each excavated foundation using the excavator and chains/slings. The base and body section of each end masts will then be assembled next to the excavation.
4. Concrete trucks will pour concrete directly into each excavation in distinct stages.
5. A final pour for the end masts is the encasing of the end masts leg which will be finished 300mm over finished ground level. The leg of the end masts is required to be shuttered with metal panels to form the required shape.
6. Once the concrete is set after five days the shuttering is removed and if used sheet piles removed.

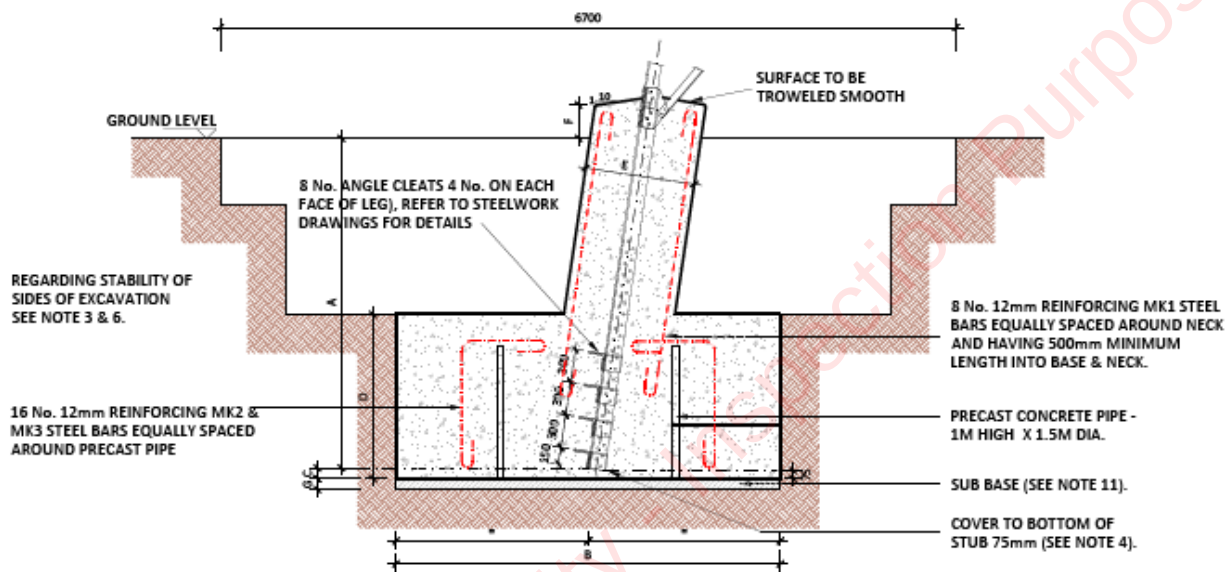


Figure 2: New End masts Foundation



Figure 3: Typical 110kV end masts foundation excavation

7. The End masts foundations will be backfilled one leg at a time with the material already excavated at the location. The backfill will be placed and compacted in layers. All dimensions will be checked following the backfilling process. All surplus excavated material will be removed from the end masts locations and stored in berms for reuse across the construction site.



Figure 4: Base of End masts Structure Backfilled

8. For the end masts located under the existing line, the line will be de-energised by ESB so work can commence on the construction of the end masts. Where it is offline the end masts will be built without an outage.
9. An earth mat consisting of copper or aluminium wire will be laid circa 400mm below ground around the end masts. This earth mat is a requirement for the electrical connection of the equipment on the end masts structure.
10. Once the base section of each end masts is completed and the concrete sufficiently cured, it is ready to receive the end masts body.
11. A hardstand area for the crane will be created by laying geogrid material on the ground surface and overlaying this geogrid with a suitable grade of aggregate.
12. A physical barrier (Heras Fence Site Boundary) will be put in place to restrict plant from coming too close to the OHL.
13. The end masts will be constructed lying flat on the ground beside the recently installed end masts base.
14. The conductor will be moved off centre using a stay wire and weights to anchor the stay wire to ground.
15. The end masts section will be lifted into place using the crane and guide ropes.
16. The body sections will be bolted into position.
17. The conductor will be centred over the end masts and held in place. Once the conductor is secured at both ends it is then cut and attached onto each end masts. The section of conductor in between the two end masts will be removed and utilised as connector wire for the new end masts.
18. Down dropper conductors (For Electrical Connections, Insulators, Surge arrestors), shackles and all associated accessories required for transition from line to cable will be installed on the interface end masts.
19. The circuit will be tested in both directions before the line is re-energised.



Figure 5: Cable End Mast



Figure 6: Cable End Mast

4.0 Proposed Substation Build

The Cunlaghfadda 110kV substation will be constructed to loop-in the existing Cloon-Castlebar 110kV overhead line. The Cunlaghfadda 110kV substation will be made up of a control building, transformer compound and busbar compound. The control building works will consist of foundation works, block work, roofing, low voltage electrical fit out, cladding and building finishing works. The transformer, cable chair and structural steelwork will be installed in the transformer compound. The busbar compound structural steelwork will be erected. Substation electrical equipment will be installed once the control building and compound is complete. Palisade fencing will be erected around the compound for security/protection and a concrete post and rail fence to mark the substation boundary.

5.0 Substation Construction

Equipment	Materials:
• Up to 10 Electrical/Civil Crews • Tracked Excavators • 360° tracked excavators (13 ton normally, 22 ton for rock breaker) • Tracked dumpers / tractors and trailers • Crane • Hoist • Power Tools • Generator • Scaffolding	• Stone • Geotextile • Lighting • Paving • Fencing • Steel Uprights • Concrete • Timber • Cladding • Doors

The proposed construction scope will require the relevant personnel, machinery and materials which is as follows:

1. This new substation will be in a compound of circa 125m x 100m plan area secured by a 2.6m high palisade fence.
2. The substation compound and drainage will be marked out by a qualified engineer.
3. A drainage system will be excavated and installed around the compound area.
4. Topsoil and subsoil will be removed from the footprint of the compound using an excavator. The excavated material will be temporarily stored in adjacent berms for later use during reinstatement works.
5. A layer of geotextile material will be laid over the footprint of the compound.
6. Using an excavator, a base layer of Clause 804 material will be laid followed by a 6F2 capping layer which will provide the finished surface.
7. Each layer will be compacted using a vibrating roller.
8. Earthing cable will be laid underground around the substation for connection to the various electrical components during the electrical fit out phase.
9. The construction of an 12206.8m² substation compound comprising of approx. 437.5m² single storey 110kV substation control building, a 216.4m² IPP building and associated outdoor electrical equipment, including 1 no. 110kV transformer, associated internal access track, 2.6m high station perimeter fencing and concrete post and rail property boundary fence will be built.
10. Adequate lighting will be installed around the compound on the lighting end masts.
11. Lightning protection end masts of approximate height 18m will be installed to protect the station from direct lightning strikes.
12. The electrical installation is expected to take 20 weeks and includes the following:
 - Delivery and installation of 33/110kV transformer. These are unusually large and the deliveries will be managed in accordance with regulations governing the movement of large loads.
 - Delivery and installation of all other HV equipment.
 - Wiring and cabling of HV/LV equipment, protection and control cabinets.

- Commissioning of all newly installed equipment.



Figure 7: Typical 110kV Electrical Infrastructure



Figure 8: Typical 110kV Transformer Connection

6.0 UGC Construction Methodology – Private Land

The proposed UGC will consist of 2 No. trenches with a minimum of 2m separation distance between each circuit. Each trench will contain 3 No. 160mm diameter HDPE power cable ducts and 3 No. 125mm diameter HDPE communications duct to be installed in an excavated trench, typically 825mm wide by 1,315mm deep, with variations on this design to adapt to bridge crossings, service crossings and watercourse crossings, etc. The power cable ducts will accommodate 3 No. power cables. The communications duct will accommodate a fibre cable to allow communications between the Cunlaghfadda substation and the adjoining Cloon and Castlebar 110kV substations. The ducts will be installed, the trench reinstated in accordance with landowner/Mayo County Council specification, and then the electrical cabling/fibre cable is pulled through the installed ducts. Construction methodologies to be implemented and materials to be used will ensure that the UGC is installed in accordance with the requirements and specifications of EirGrid and ESB.

6.1 Trenching Methodology

The following section outlines the methodology to be followed during trenching works:

- The Contractor, and their appointed Site Manager, will prepare a targeted Method Statement concisely outlining the construction methodology and incorporating all mitigation and control measures included within the planning application and accompanying reports and as required by planning conditions where relevant.
- All existing underground services shall be identified on site prior to the commencement of construction works;
- Where the cable route intersects with culverts, the culvert will remain in place (where possible) and the ducting will be installed either above or below the culvert to provide minimum separation distances in accordance with ESB and Irish Water specifications;
- Traffic management measures will be implemented in accordance with those included in the Traffic Management Report, and a detailed Traffic Management Plan will be prepared and agreed with Mayo County Council;
- Excavated material will be temporarily stockpiled onsite for re-use during reinstatement. Stockpiles will be restricted to less than 2m in height. Stockpiles will be located a minimum of 50m from surface water features and all stockpiling locations will be subject to approval by the Site Manager and Project Ecological Clerk of Works (ECOW);
- Excavated material shall be employed to backfill the trench where appropriate and surplus material will be transferred to the spoil deposition area;
- Any earthen (sod) banks to be excavated will be carefully opened with the surface sods being stored separately and maintained for use during reinstatement;
- The excavated trench will be dewatered if required, from a sump installed within the low section of the opened trench. Where dewatering is required, dirty water will be fully and appropriately attenuated, through silt bags, before being appropriately discharged to vegetation or surface water drainage feature;
- Where required, grass will be reinstated by either seeding or by replacing with grass turves;
- No more than a 100m section of trench will be opened at any one time. The second 100m will only be excavated once the majority of reinstatement has been completed on the first;
- The excavation, installation and reinstatement process will take on average of 1 no. day to complete a 100m section;



Figure 9: Typical 110kV Underground Duct Installation on Private Land

6.2 Ducting Installation Methodology

For the trenching and ducting works the following step by step methodology will apply:

1. Grade, smooth and trim trench floor when the required 1315mm depth and 825mm width have been obtained.
2. Place bedding layer of Cement Bound Granular Mixture B (CBGM B) material in accordance with the specification and compact it so that the compacted thickness is as per the drawings.
3. Lay the bottom row of ducts in trefoil formation as detailed on the design drawings. Use spacers as appropriate to establish horizontal duct spacing. Fit a secure cap / bung to the end of each duct run to prevent the ingress of dirt or water.
4. Carefully surround and cover ducts with CBGM B in accordance with the design drawings and specifications and thoroughly compact without damaging ducts.
5. Place cable protection strips on compacted CBGM B directly over the ducts.
6. Lay the top row of ducts onto the freshly compacted CBGM B including the cable protection strips above the bottom row of ducts. Place a secure cap at the end of each duct to prevent the ingress of dirt or water.

7. Carefully surround and cover ducts with CBGM B material in accordance with the drawings and thoroughly compact without damaging ducts.
8. Place red cable protection strip on top of compacted CBGM B over each set of ducts as shown on the drawings.
9. Place and thoroughly compact CBGM B material or Clause 804 backfill or soil backfill as specified and place warning tape at the depth shown on the drawings.
10. For unsurfaced/grass sections, backfill with suitable excavated material to ground level leaving at least 100 mm topsoil or match existing level at the top to allow for seeding or replace turves as per the specification of the local authority or landowner.
11. Clean and test the ducts in accordance with the specification by pulling through a brush and mandrel. Install 12 mm polypropylene draw rope in each duct and seal all ducts using robust duct end seals fitted with rope attachment eyes in preparation for cable installation later. All the works should be witnessed by ESNB Clerk of Works (CoW) as required.

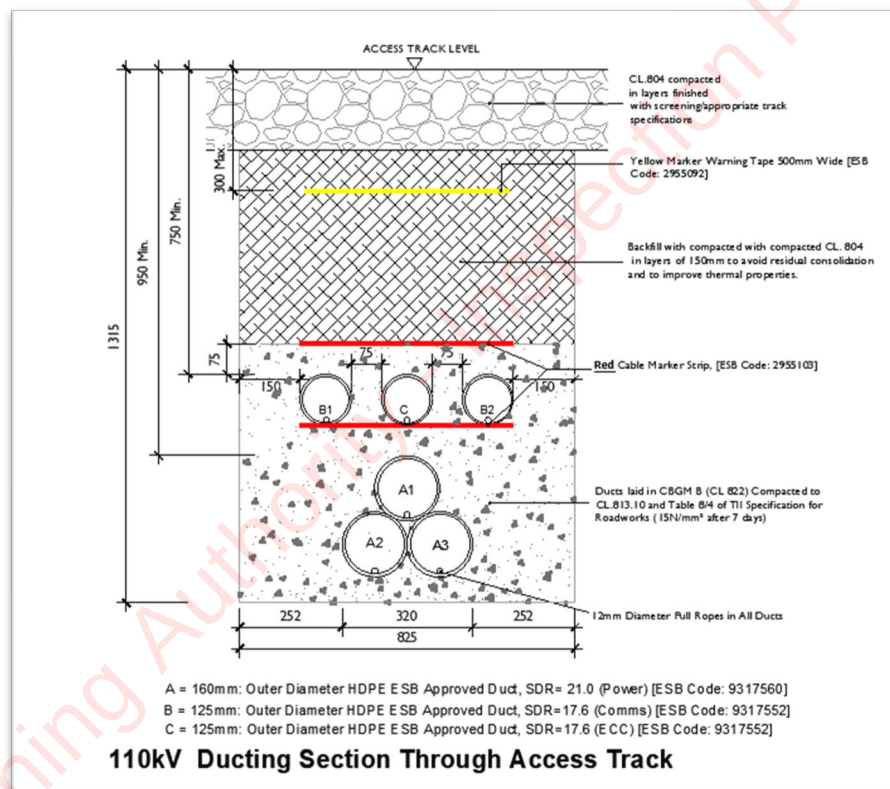


Figure 10: Typical Single Trench in Access Track

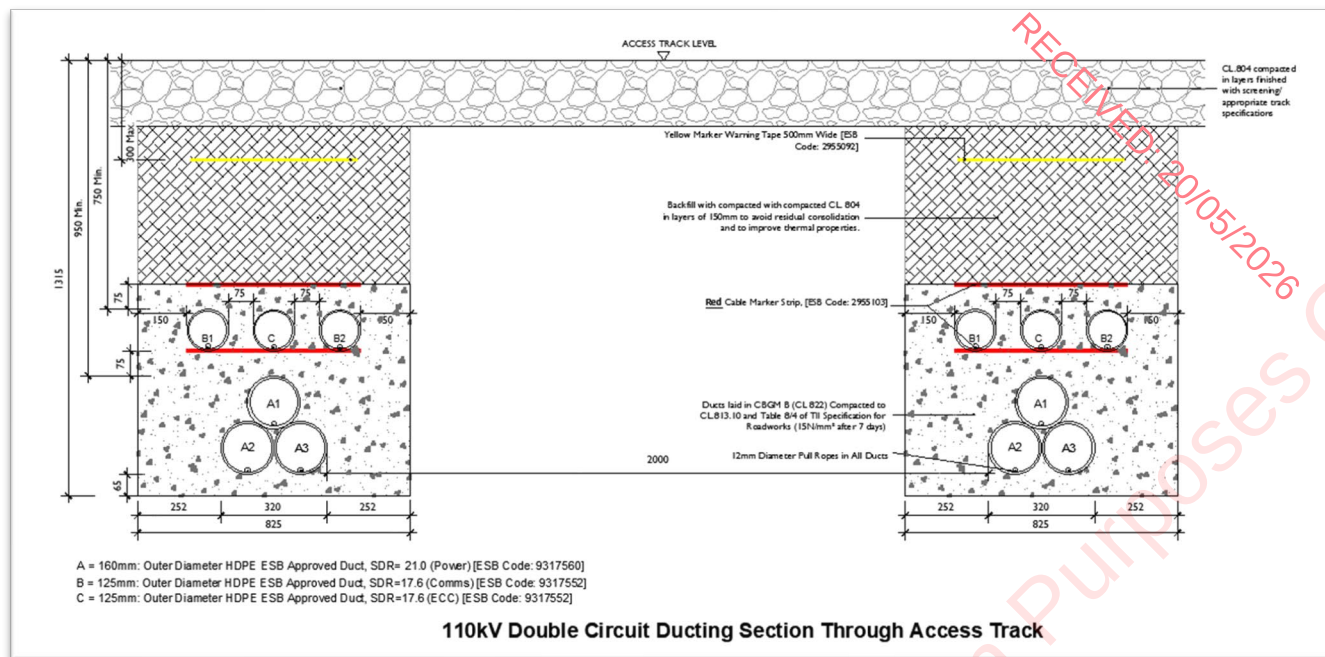


Figure 11: Typical Double Trench in Access Track

Equipment:

- 1 no. tracked excavator (only rubber tracked machines will be allowed on public roads);
- 1 no. dumper or tractor and trailer.

Materials:

- Sand for pipe bedding;
- Ready-mix Concrete where necessary (delivered to site);
- Trench backfilling material (excavated material and aggregates) to relevant specifications;
- 160mm diameter HDPE ducting;
- 125mm diameter HDPE ducting;
- Temporary Surface Reinstatement Materials

6.3 Surface Cable Markers & Marker posts

Surface cable markers will be placed along the route where cable depth is unavoidably shallow, due to constraints such as existing services, to indicate the precise location of the UGC. These markers will be metallic plates in accordance with ESB standards.

Marker posts will be used on non-roadway routes to delineate the cable route. Corrosion proof aluminium triangular danger sign, with 700mm base, and with centred lightning symbol, on engineering grade fluorescent yellow background shall be installed in adequately sized concrete foundations. Marker posts shall also be placed if burial depth is not to standard. Siting of marker posts to be dictated by ESB as part of the detailed design process. Figure 12

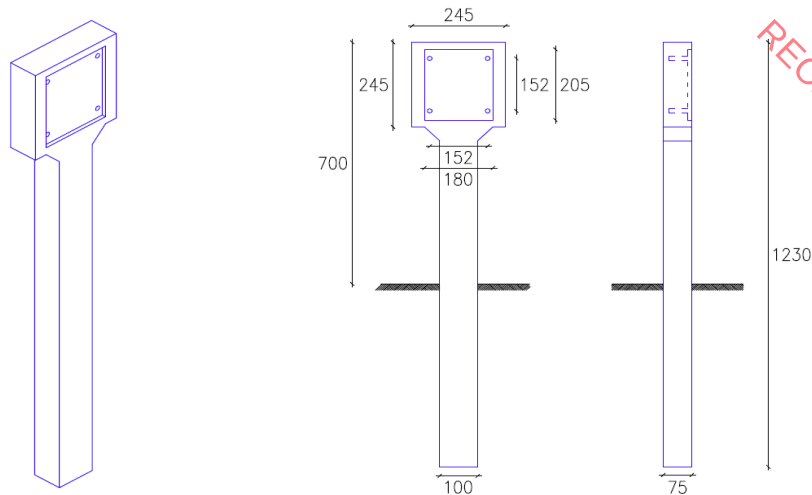


Figure 12: Typical ESB Marker Posts Example

6.4 Managing Excess Material from Trench

All excavated material will be temporarily stored adjacent to the trench prior to re-use in the trench reinstatement (where applicable). Stockpiles will be restricted to less than 2m in height. Where excess material exists, it will be disposed of to the spoil deposition area.

6.5 Storage of Plant and Machinery

All plant, machinery and equipment will be stored on site within the works area or within the temporary construction compound to be located within the Cunlaghfadda Wind Farm. Oils and fuels will not be stored on site and will be stored in an appropriately bunded area within the temporary construction compound.

1. The cable is supplied in pre-ordered lengths on large cable drums (Figure 13). Installing “one section” of cable normally involves pulling three individual conductors into three separate ducts. The cable pulling winch must be set at a predetermined cut off pulling tension as specified by the designer. The cable will be connected to the winch rope using approved suitably sized and rated cable pulling stocking and swivel or the pulling head fitted by the cable manufacturer. A sponge may also be secured to the winch rope to disperse lubricant through the duct. Lubrication is also applied to the cable before it enters the duct.



Figure 13: HV cable pulling procedure (Typical drum set-up)

Equipment:

- 1 Excavator Operator
- 360° tracked excavator (13 ton normally, 22 ton for rock breaker)
- 1 no. tracked dumper or tractor and trailer

Materials:

- Sand for pipe bedding
- Blinding Concrete where necessary
- Clause 804 Material
- 160mm diameter HDPE ducting;
- 125mm diameter HDPE ducting;
- Precast Chamber Units / Relevant construction materials for chambers
- Link Box

7.0 Access Routes to Work Area, Crane Pads and Temporary Laydowns

Access tracks, laydown areas and crane pads on the consented land (if required due to ground conditions and/or landowner requirements) will consist of crushed rock on a geotextile. Upon completion of the works, all access tracks will remain in place for future access to the substation and wind farm grounds. Access routes will be carefully selected to avoid any damage to land. Local consultation will be carried out with the relevant landowners to ensure that any potential disturbance will be minimised. Prior to the commencement of construction, the contractor will assess all access routes and determine specific requirements for each area.

Any such requirements will be incorporated into the relevant method statement. A combined laydown and crane pad area (40x82m) will be utilised for tower installation and erection.



Figure 14: Access Track



Figure 15: Access Track Build-up with Geotextile



Figure 16: Crane pad and laydown areas

8.0 Programme

Estimates for the duration of the construction works are included in the table below. Please note that some of the elements are likely to happen concurrently, therefore the overall start-to-finish duration is estimated to be fourteen months.

Table 3: Estimated Construction Duration (Activities Run Concurrently)	
Development Element	Estimated Construction Duration
Construct 110kV Substation	14 months
Overhead Line Structures	3 months
Underground Cable	3 months
Connection to Existing OHL and Commissioning	6 weeks
Total	14 Months