

APPENDIX 1: DRAWINGS

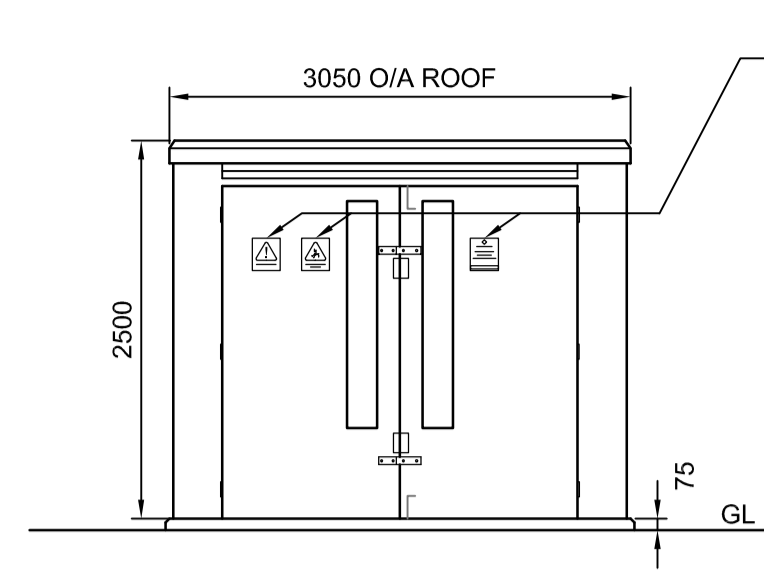
The guidance drawings listed below are typical layout and construction details deemed to satisfy SPEN's functional civil and building requirements for Secondary Substations.

Constructors shall note that where provided such typical details may be generic and may not reflect exact on-site requirements on a project/site-specific basis.

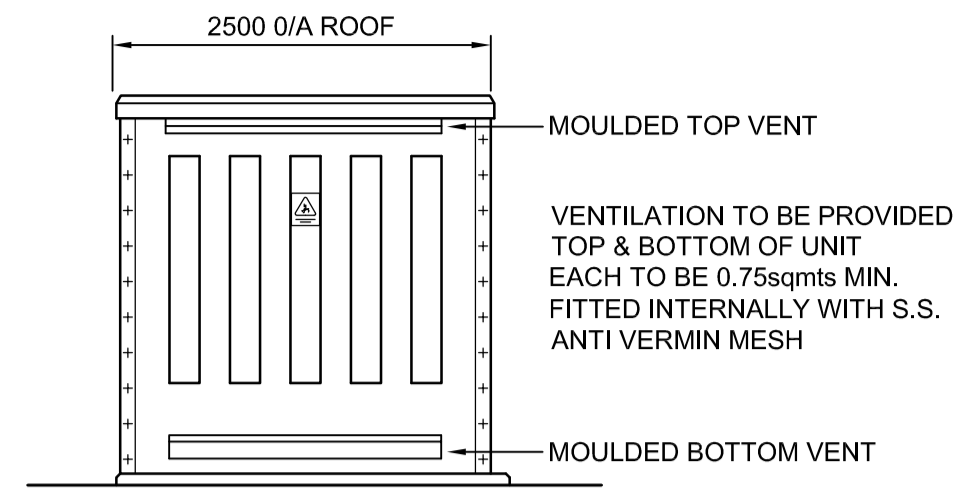
Where applicable and considered appropriate by SPEN, additional typical deemed to satisfy construction detail drawings may be issued on a project-specific basis.

Variations or changes to the 'deemed to satisfy guidance drawings' shall be submitted to SPEN for audit and agreement prior to any work starting on-site.

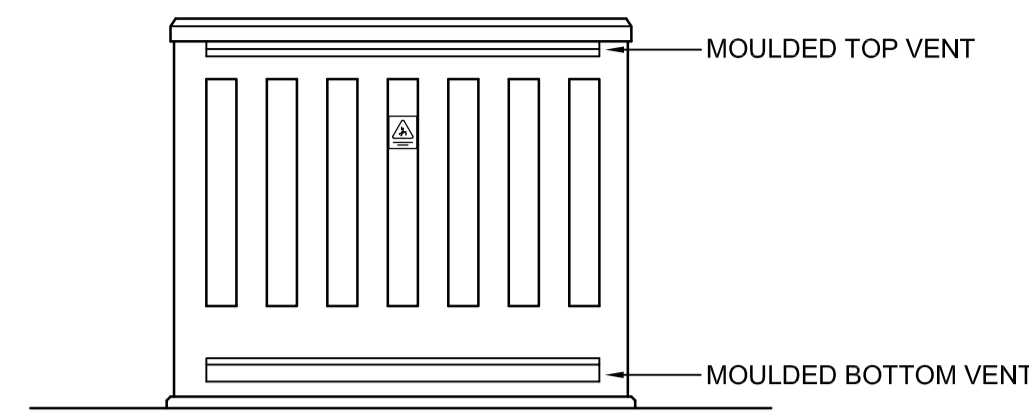
Drawing No.	Drawing Title	Revision
SP2022244	Typical 11kV GRP Plinth (No Metering)	5
SP2103445	Typical 11kV GRP Plinth (With Metering)	5
SP2142493	Typical 11kV RMU GRP Plinth (With Metering)	5
SP3020357	Typical 11kV Brick Built Substation (Close Coupled Gear)	6
SP4000542	Typical Z Vent Louvered Ventilation Unit for Brick Built Substation	5
SP4000543	Typical Hardwood Doors for 11kV Substations	4
SP4000545	Typical 11kV Brick Built Substation (X or Y Type Separate Gear)	5
SP4008870	Typical 11kV Brick Built Substation (3 Panel Board with Metering)	6
SP4049060	Typical 11kV Brick Built Substation (D or G Type RMU With Metering)	10
SP4053389	Typical 11kV Brick Built Substation (Double Side by Side)	3
SP4058664	Typical 11kV Brick Built Substation (Double Square)	3
SP4102117	Typical 11kV GRP Plinth D Type RMU with MU Single Plinth	2
SP4105959	Typical 11kV Brick Built (LV Generation Substation	3
SP4132847	Typical 11kV GRP Plinth G or D Type RMU (indoor Kit)	2
SP4187952	Typical 11kV GRP Plinth (4m x 2.45m) (No Metering)	1



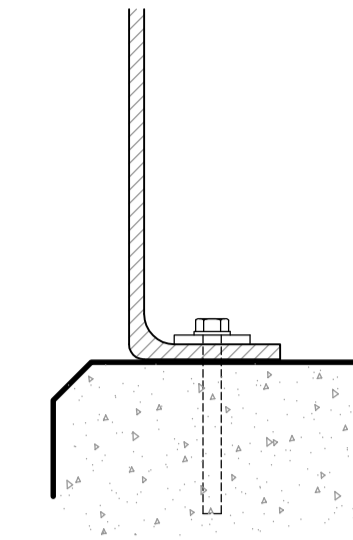
FRONT ELEVATION



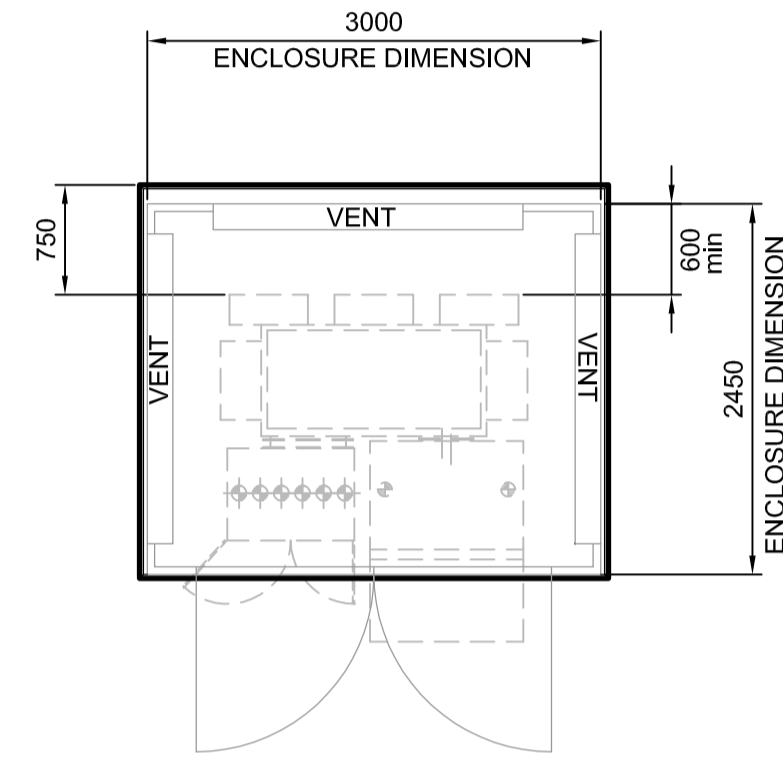
SIDE ELEVATION
OPPOSITE SIDE IDENTICAL



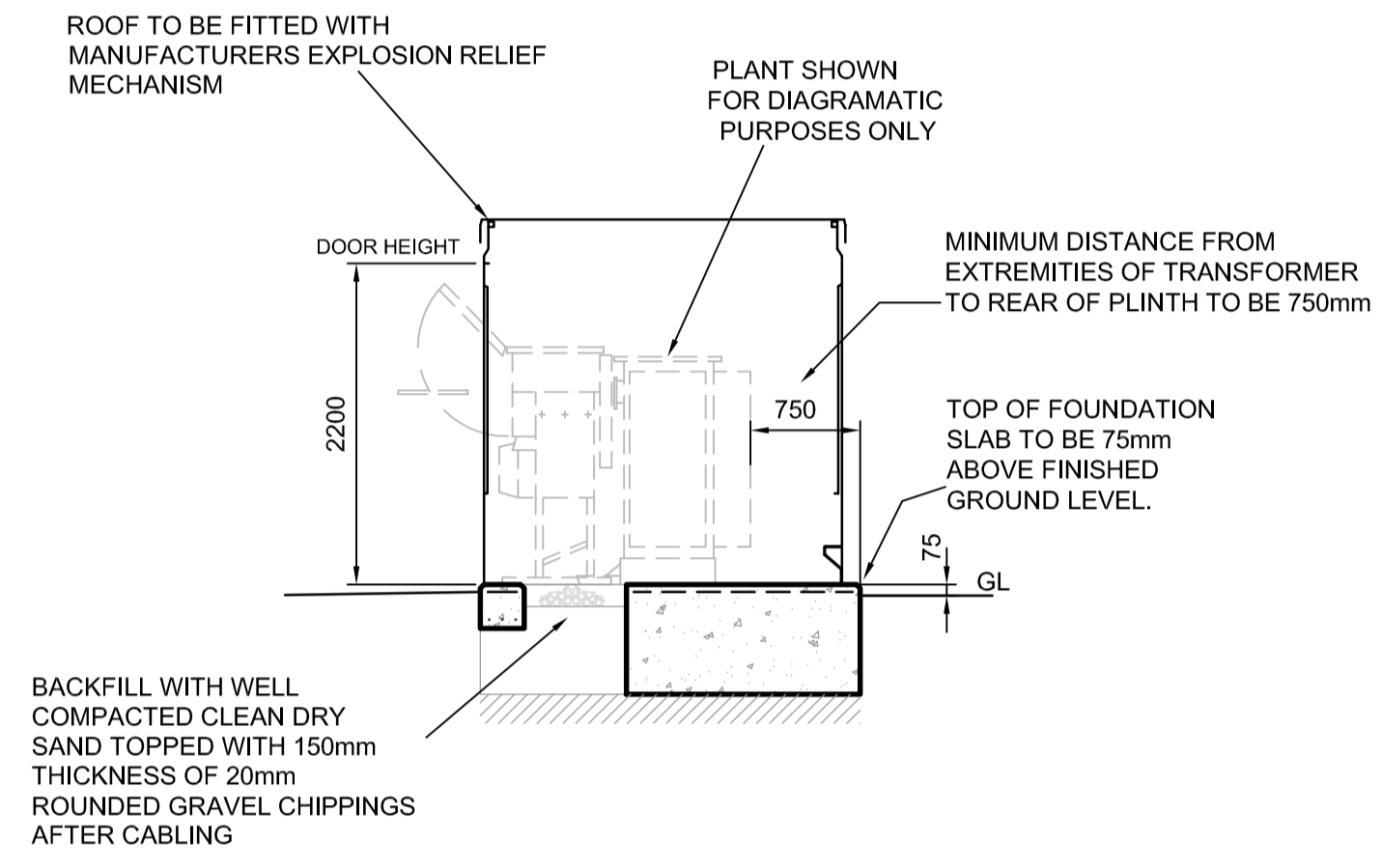
REAR ELEVATION



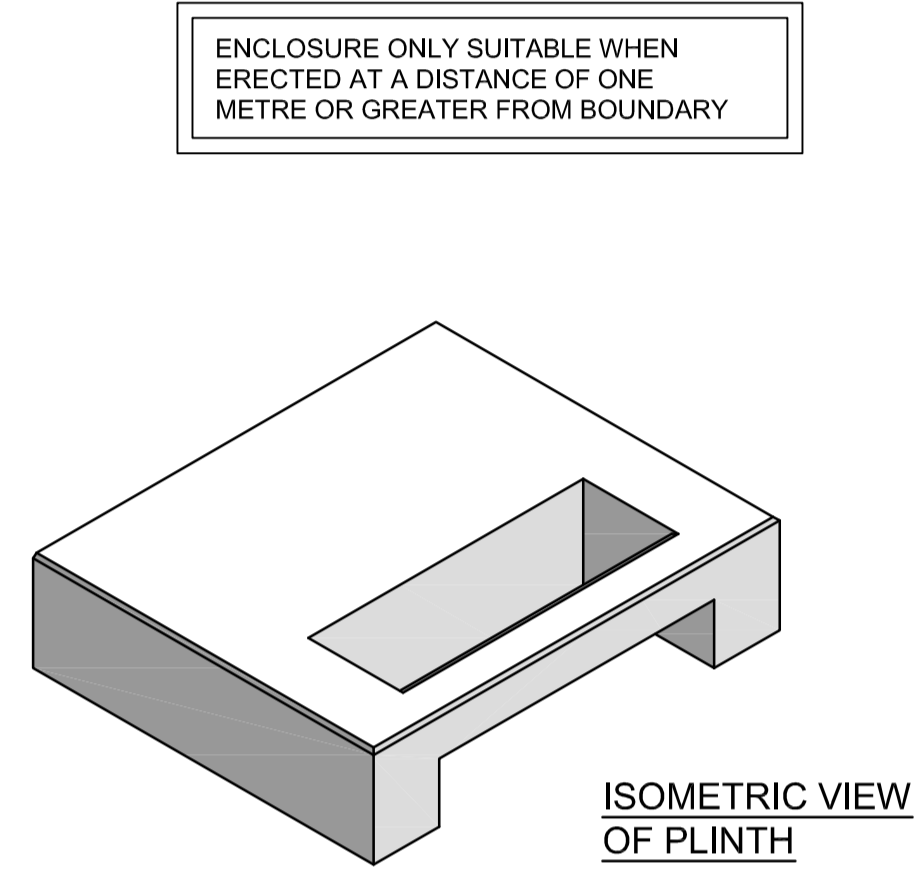
TYPICAL HOLDING DOWN DETAIL



PLANT LAYOUT PLAN



PLANT SECTION



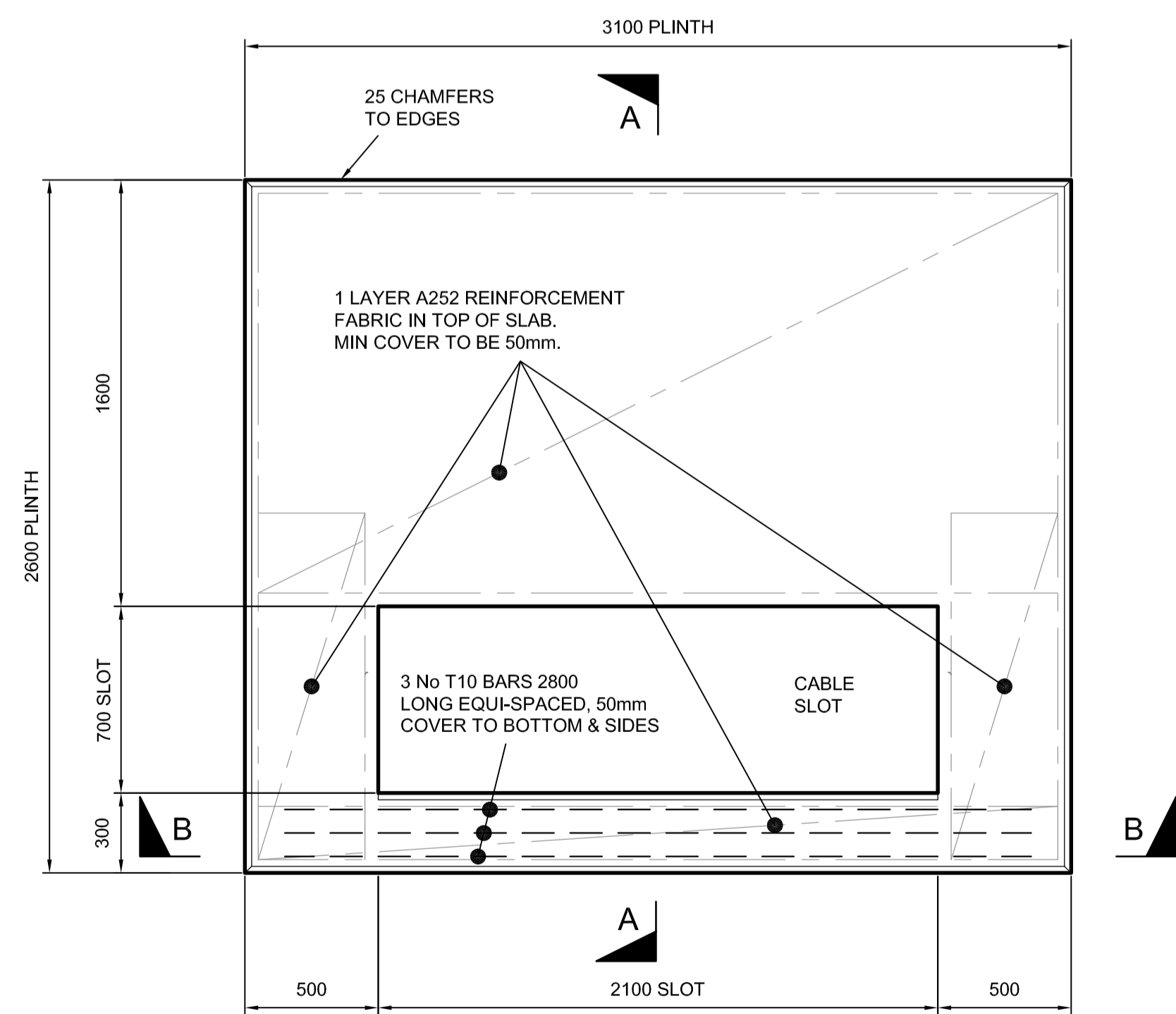
ISOMETRIC VIEW OF PLINTH

ENCLOSURE ONLY SUITABLE WHEN ERECTED AT A DISTANCE OF ONE METRE OR GREATER FROM BOUNDARY

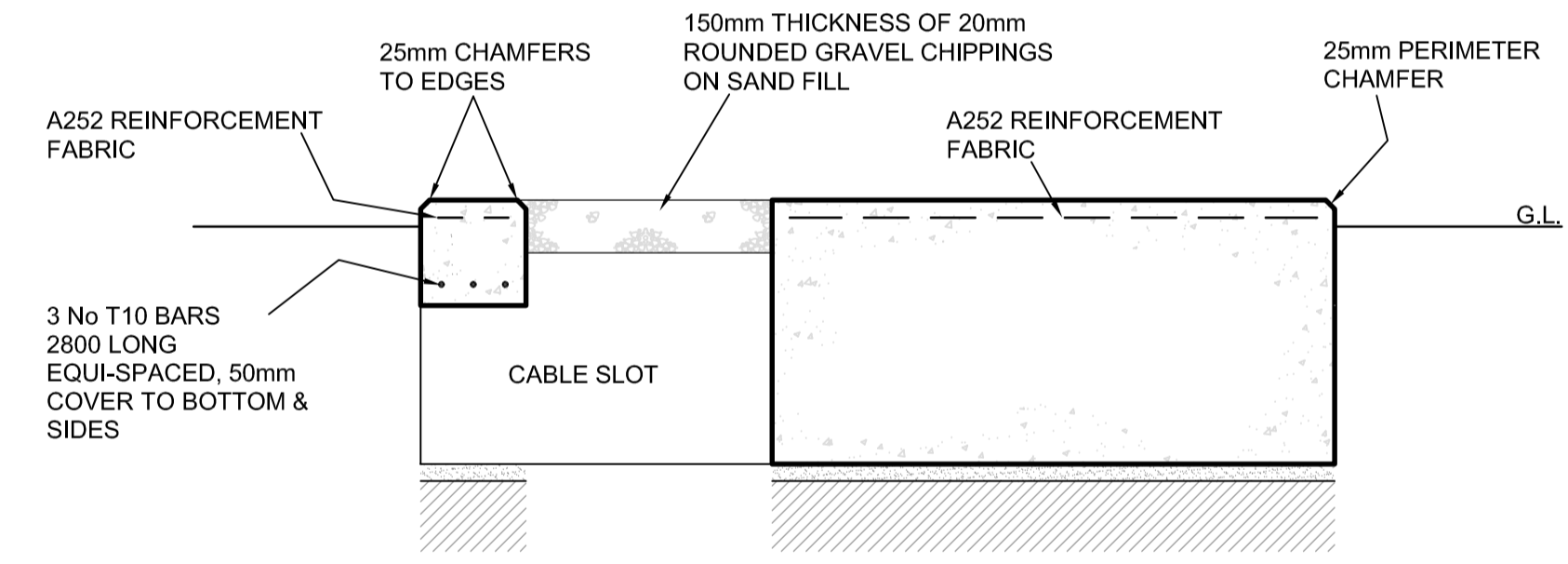
NOTES

- CONCRETE
THE CONCRETE TO BE IN ACCORDANCE WITH THE SPECIFICATION AND ATTAIN THE RELEVANT CUBE CRUSHING STRENGTH AT 28 DAYS.
- EARTHWORKS
PLINTH TO BE SET ON UNDISTURBED INORGANIC STRATA THAT PROVIDE THE REQUIRED MINIMUM DESIGN SAFE GROUND BEARING CAPACITY.
- PLINTH (CONCRETE 40N/mm² 28 DAY CUBE STRENGTH)
A FLAT, LEVEL AND SMOOTH FLOOR SURFACE IS ESSENTIAL FOR INSTALLATION OF PLANT. TOLERANCE TO FINISHED LEVEL EXPRESSED AS A MAXIMUM PERMISSIBLE DEVIATION BENEATH A STRAIGHT EDGE WITH FEET PLACED ANYWHERE ON THE FLOOR SHALL NOT EXCEED 1mm IN 1M OR 3mm IN 3M.
- CABLE SLOT
ON COMPLETION OF CABLING, CABLE AREA TO BE FILLED WITH DRY SAND AND TOPPED WITH 150mm DEPTH OF 20mm ROUNDED GRAVEL CHIPPINGS
- FOUNDATION & FLOOR LAYOUT DETAILS INDICATED ARE TYPICAL FOR UNIT SUBSTATIONS HOUSING OUTDOOR EQUIPMENT AND WOULD NOT THEREFORE BE APPLICABLE TO OTHER SUBSTATION TYPES.

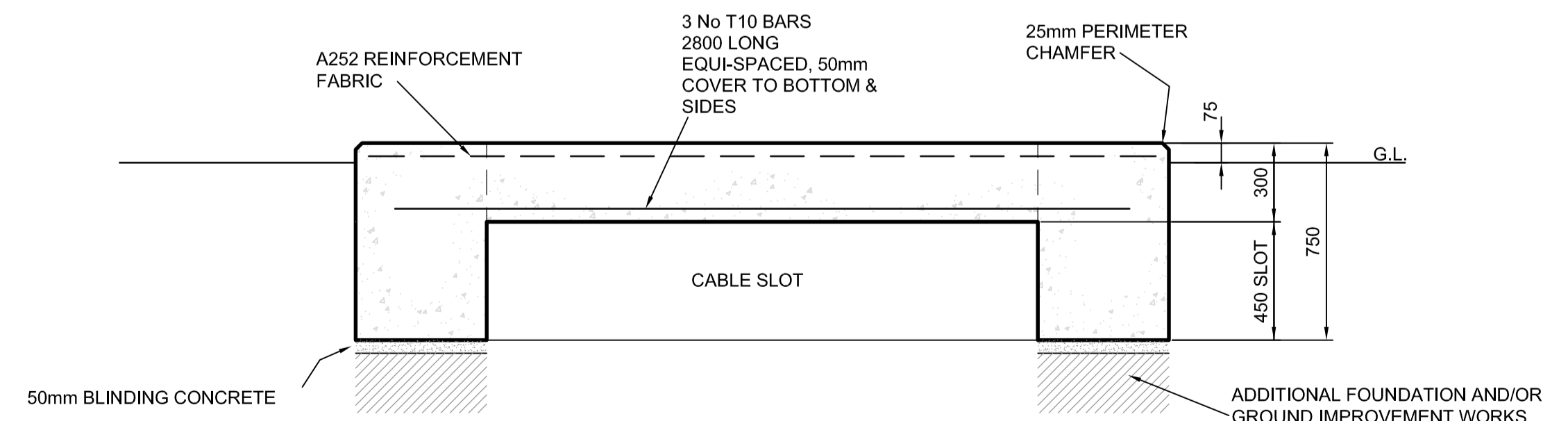
THIS DRAWING TO BE READ IN CONJUNCTION WITH SUB-03-017 'GENERAL SPECIFICATION FOR THE CIVIL ENGINEERING AND BUILDING DESIGN AND CONSTRUCTION OF SECONDARY SUBSTATIONS'



FOUNDATION PLAN
SCALE 1:20



SECTION A - A
SCALE 1:20



SECTION B - B
SCALE 1:20

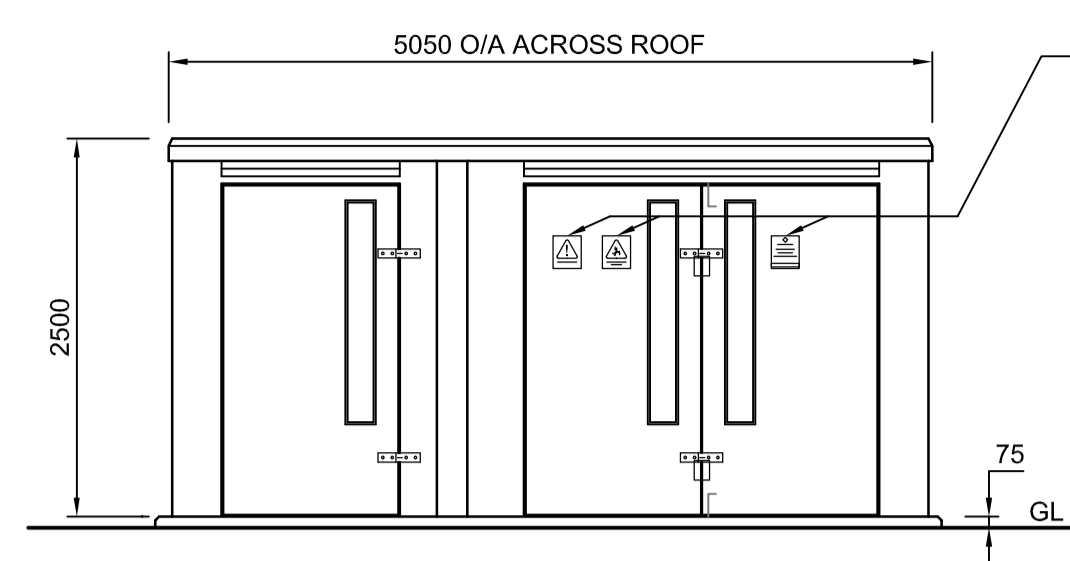
Rev.	Date	UPDATED
5.0	MAR.2010	
Drawn	M.T.	
Checked	C.W.	
Approved	A.J.R.	



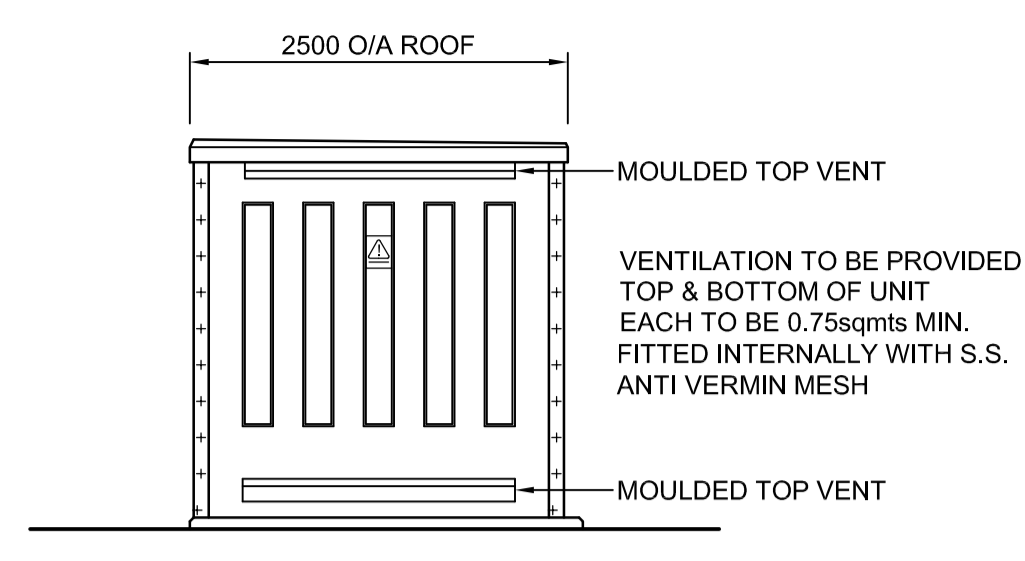
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System Design, Drawing Office
3 Prenton Way, Prenton, CH43 3ET
Telephone 0151 6092491

TYPICAL FOUNDATION PLINTH FOR 11KV UNIT SUBSTATION WITH 3.0 X 2.45M GRP ENCLOSURE

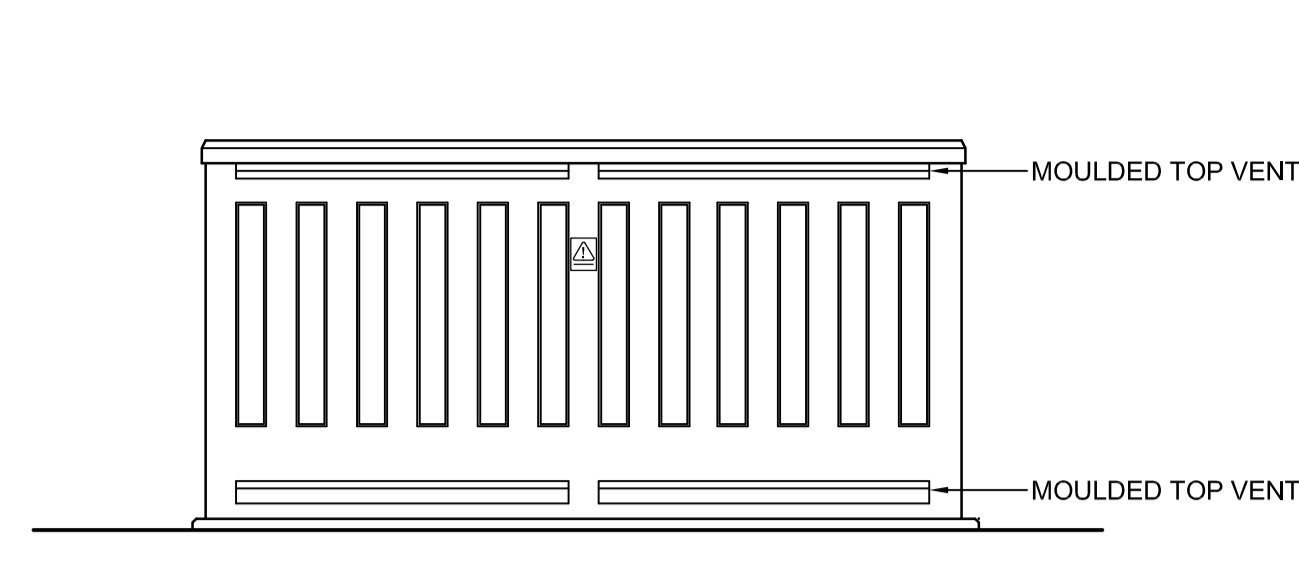
Location TYPICAL					
Drawn	Date	Checked	Date	Approved	Date
T.C.	27/3/96	H.R.B.	27/3/96	C.W.	27/3/96
Status	Drg. No.			Rev.	
FOR ISSUE	SP2022244			5.0	
© Copyright property of SP PowerSystems Ltd.				Scale	Size
				1:50	A1



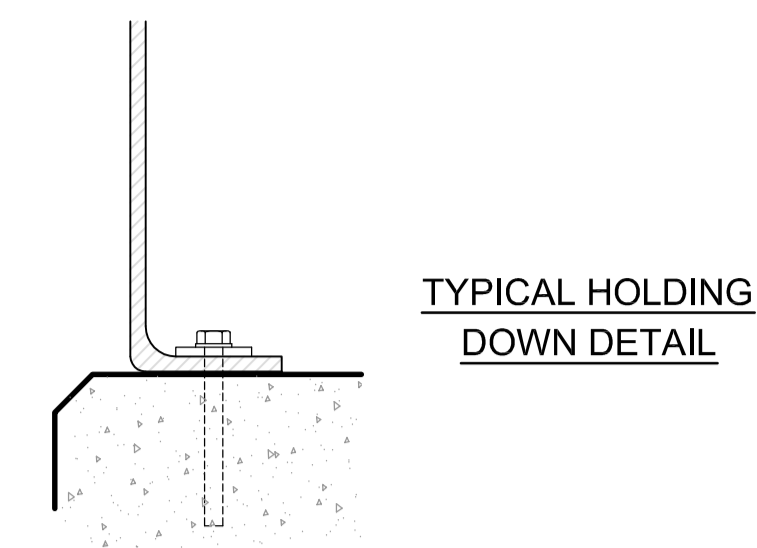
FRONT ELEVATION



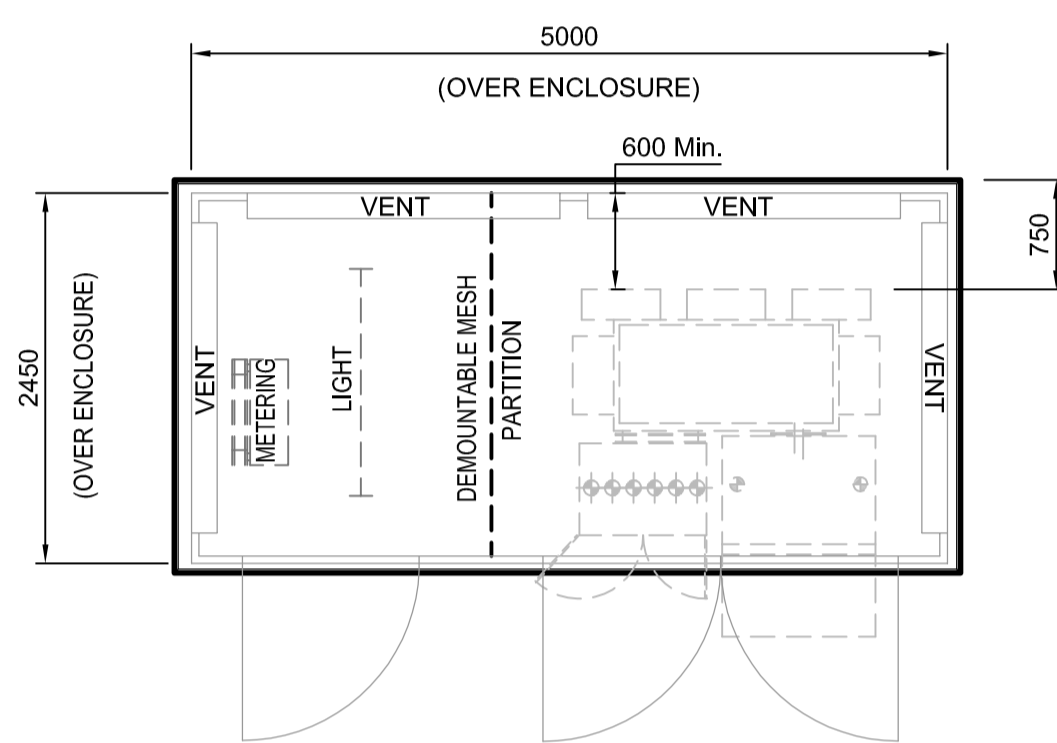
SIDE ELEVATION
OPPOSITE SIDE IDENTICAL



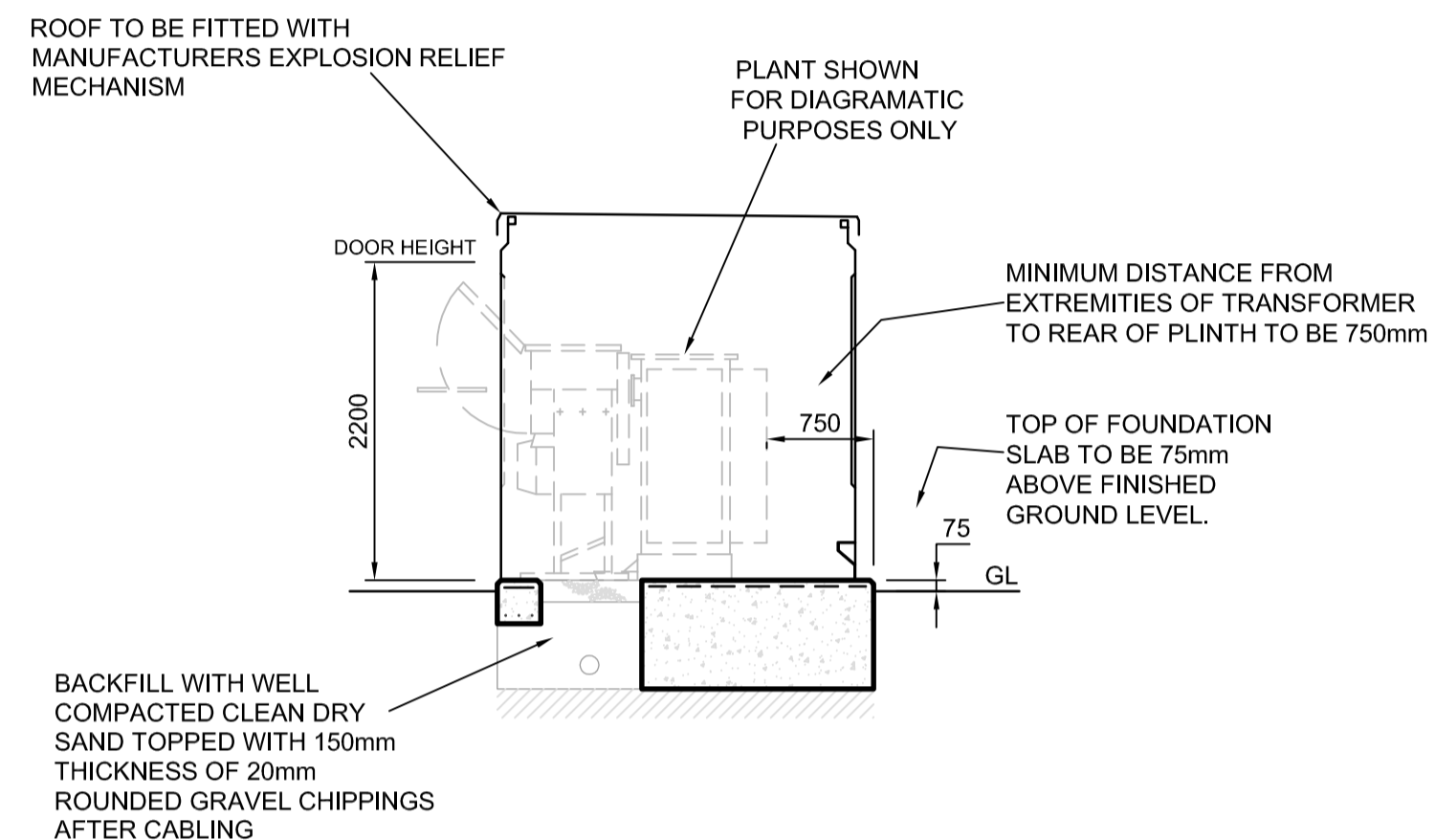
REAR ELEVATION



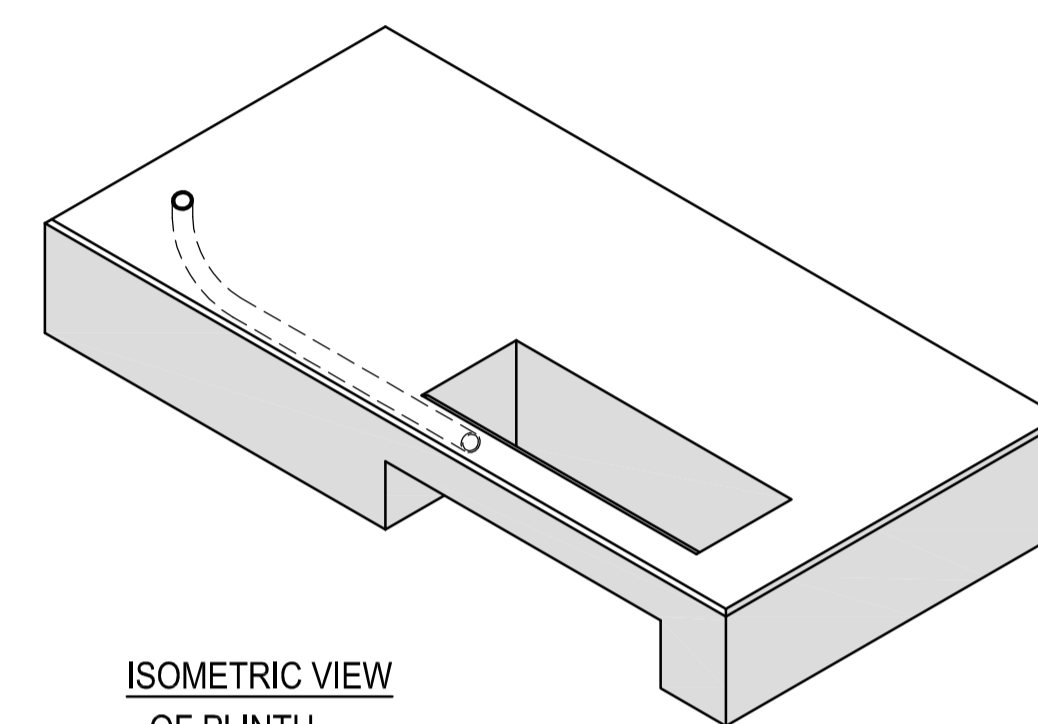
TYPICAL HOLDING
DOWN DETAIL



PLANT LAYOUT PLAN



PLANT SECTION



ISOMETRIC VIEW
OF PLINTH

ENCLOSURE ONLY SUITABLE WHEN
ERECTED AT A DISTANCE OF ONE
METRE OR GREATER FROM BOUNDARY

NOTES

CONCRETE
THE CONCRETE TO BE IN ACCORDANCE WITH THE SPECIFICATION
AND ATTAIN THE RELEVANT CUBE CRUSHING STRENGTH AT 28 DAYS.

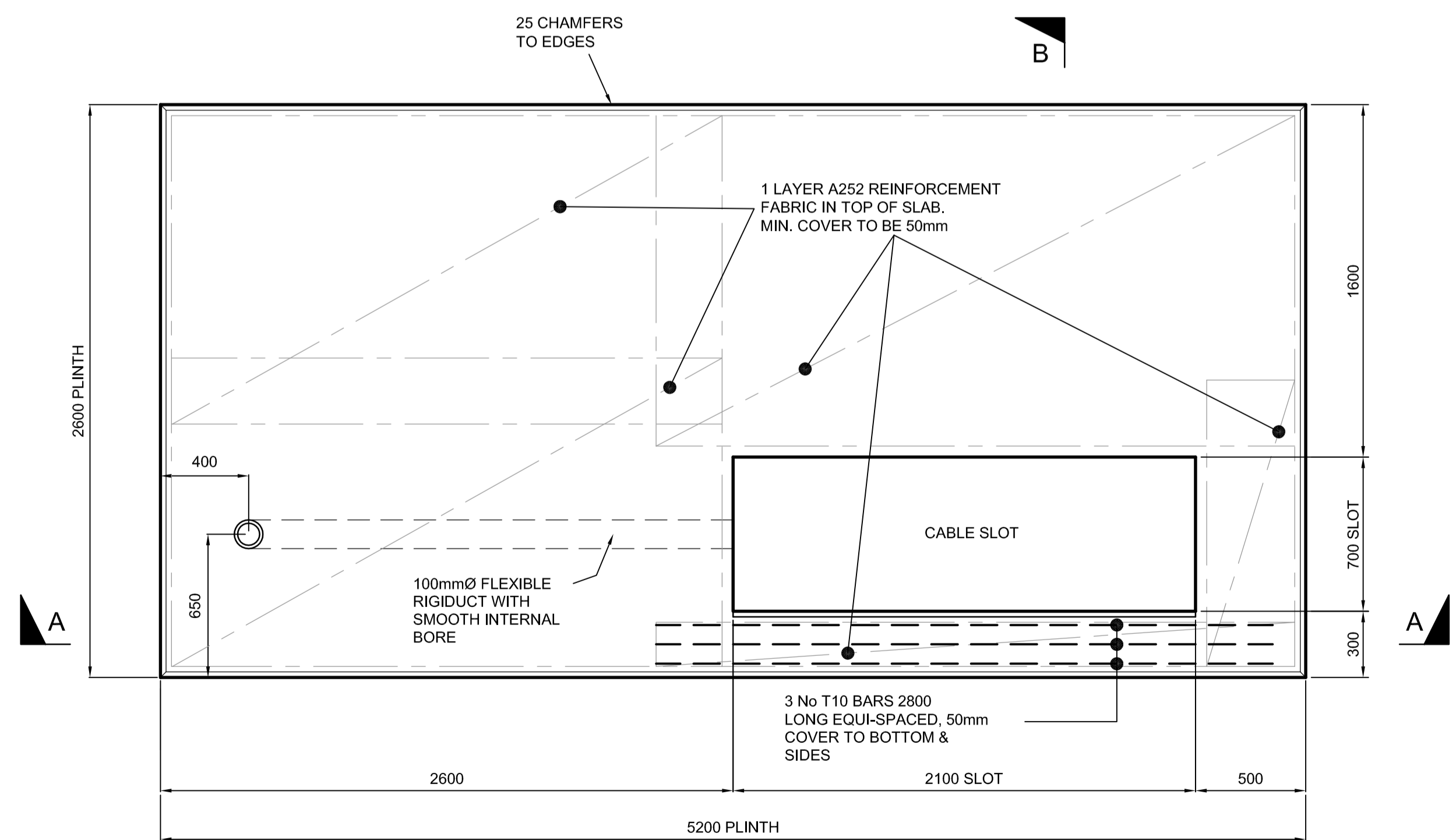
EARTHWORKS
PLINTH TO BE SET ON UNDISTURBED INORGANIC STRATA
THAT PROVIDE THE REQUIRED MINIMUM DESIGN SAFE
GROUND BEARING CAPACITY.

PLINTH (CONCRETE 40N/mm² 28 DAY CUBE STRENGTH)
A FLAT, LEVEL AND SMOOTH FLOOR SURFACE IS ESSENTIAL
FOR INSTALLATION OF PLANT. TOLERANCE TO FINISHED
LEVEL EXPRESSED AS A MAXIMUM PERMISSIBLE DEVIATION
BENEATH A STRAIGHT EDGE WITH FEET PLACED ANYWHERE
ON THE FLOOR SHALL NOT EXCEED 1mm IN 1M OR 3mm IN 3M.

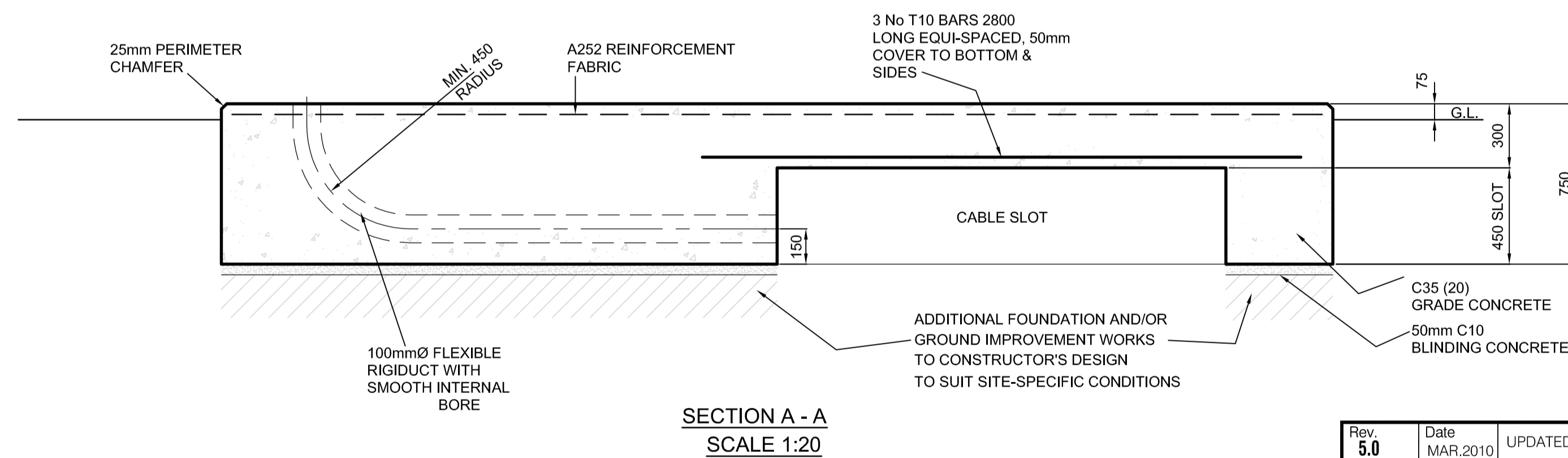
CABLE SLOT
ON COMPLETION OF CABLING, CABLE AREA TO BE
FILLED WITH DRY SAND AND TOPPED WITH
150mm DEPTH OF 20mm ROUNDED GRAVEL CHIPPINGS

FOUNDATION & FLOOR LAYOUT DETAILS INDICATED ARE TYPICAL
FOR UNIT SUBSTATIONS HOUSING OUTDOOR EQUIPMENT
AND WOULD NOT THEREFORE BE APPLICABLE TO OTHER
SUBSTATION TYPES.

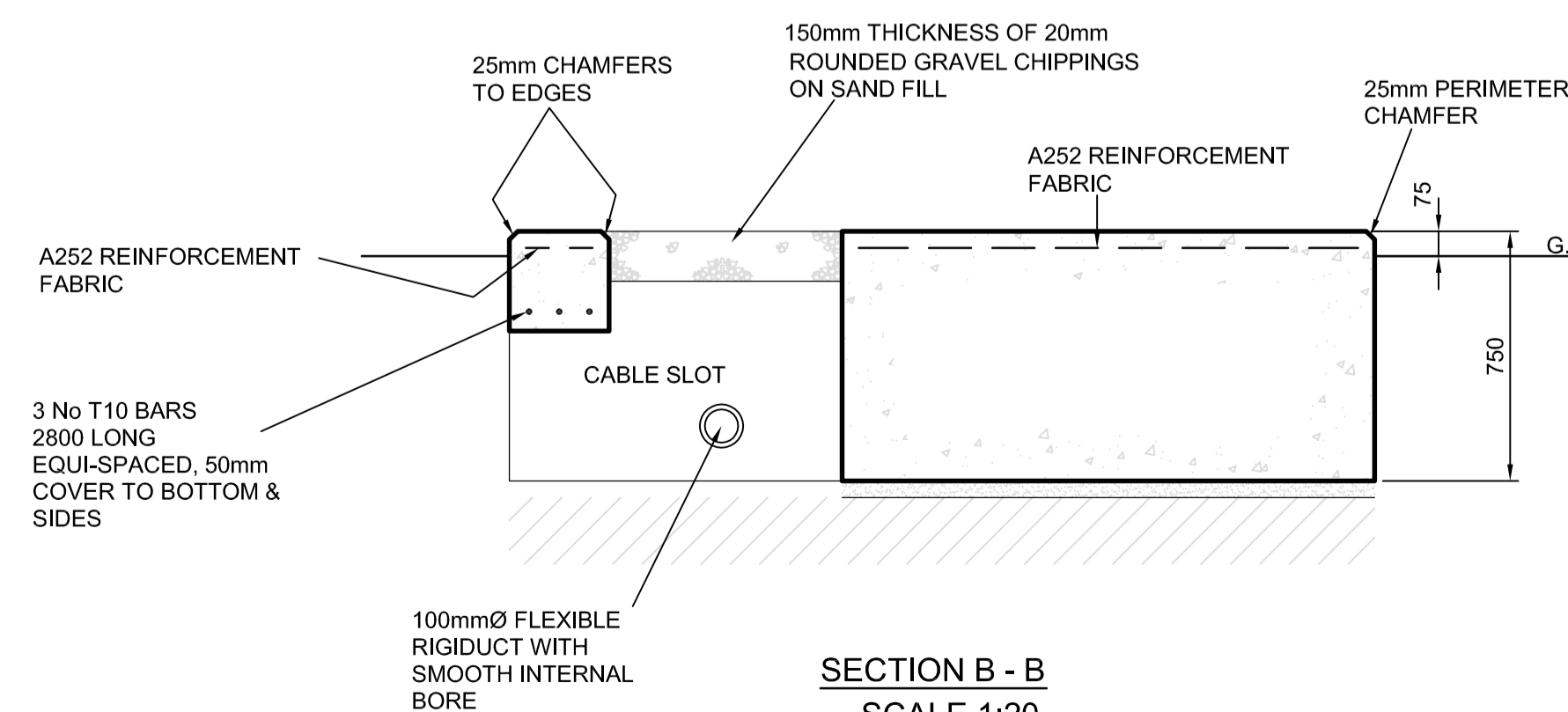
THIS DRAWING TO BE READ IN CONJUNCTION WITH
SUB-03-017 'GENERAL SPECIFICATION FOR THE
CIVIL ENGINEERING AND BUILDING DESIGN AND
CONSTRUCTION OF SECONDARY SUBSTATIONS'



FOUNDATION PLAN
SCALE 1:20



SECTION A - A
SCALE 1:20



SECTION B - B
SCALE 1:20

Rev. 5.0	Date MAR.2010	UPDATED.
Drawn M.T.		
Checked C.W.		
Approved A.J.R.		



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Telephone 0151 6092491

Title
**TYPICAL FOUNDATION PLINTH FOR
11kV UNIT SUBSTATION WITH METERING
5.0 X 2.5M GRP ENCLOSURE**

Location TYPICAL	Drawn SPEN	Date 27/03/96	Checked SPEN	Date 27/03/96	Approved SPEN	Date 27/03/96
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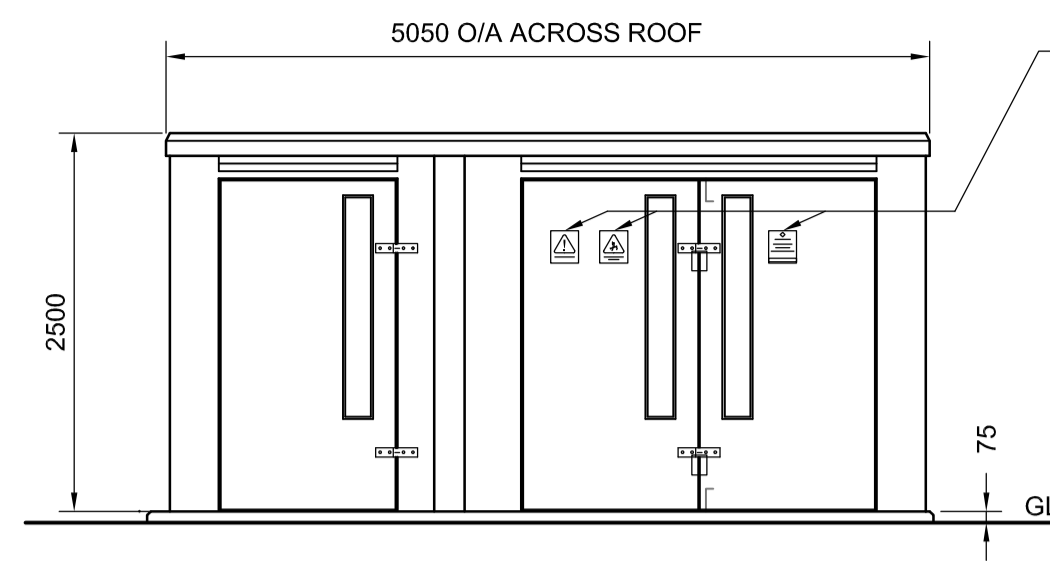
Status
FOR ISSUE

Scale
1:50

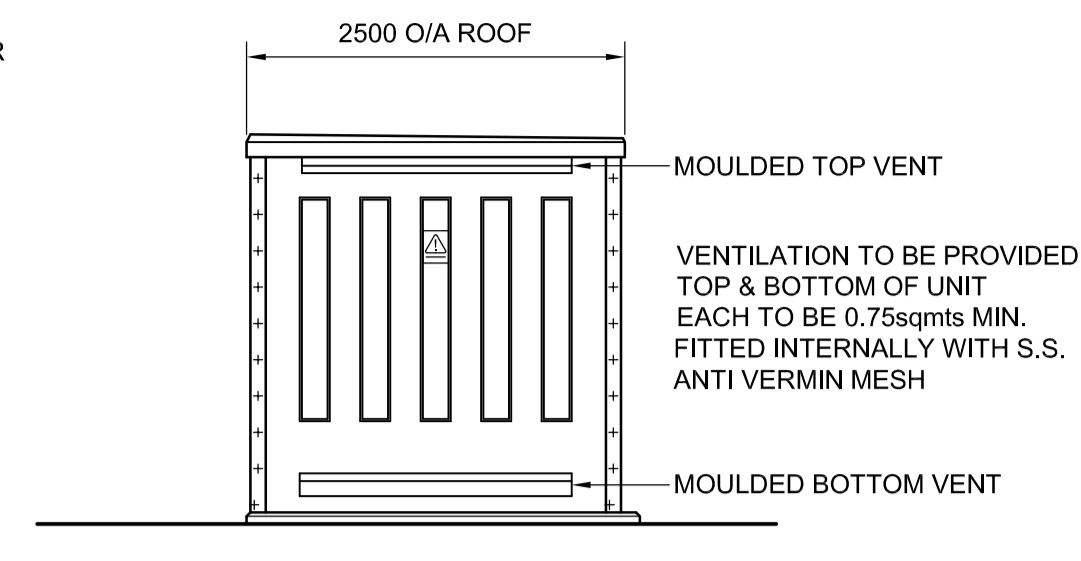
Rev. No.
SP2103445

Size
A1

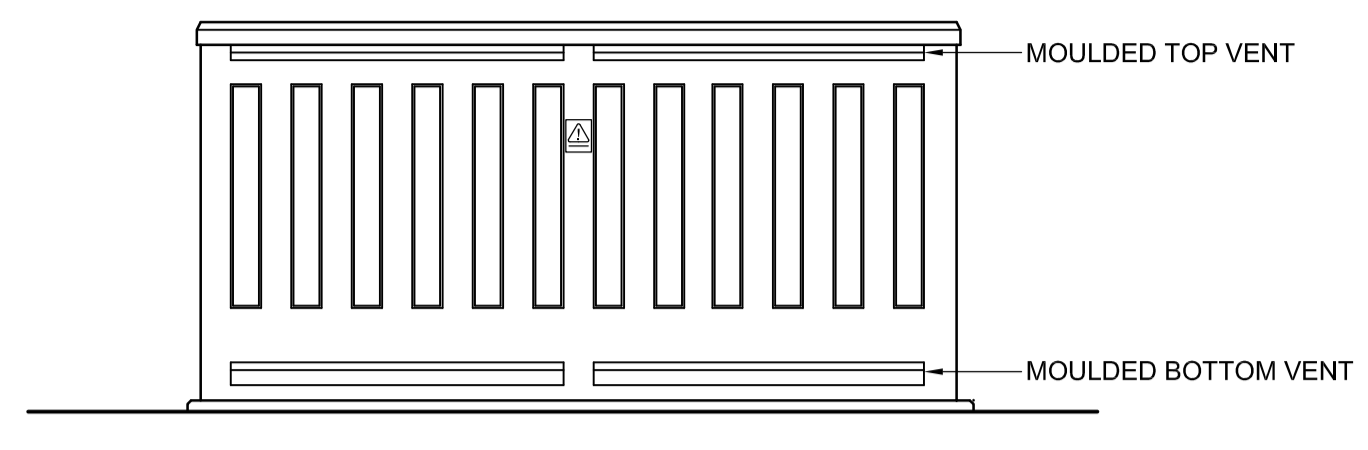
Copyright property of SP PowerSystems Ltd.



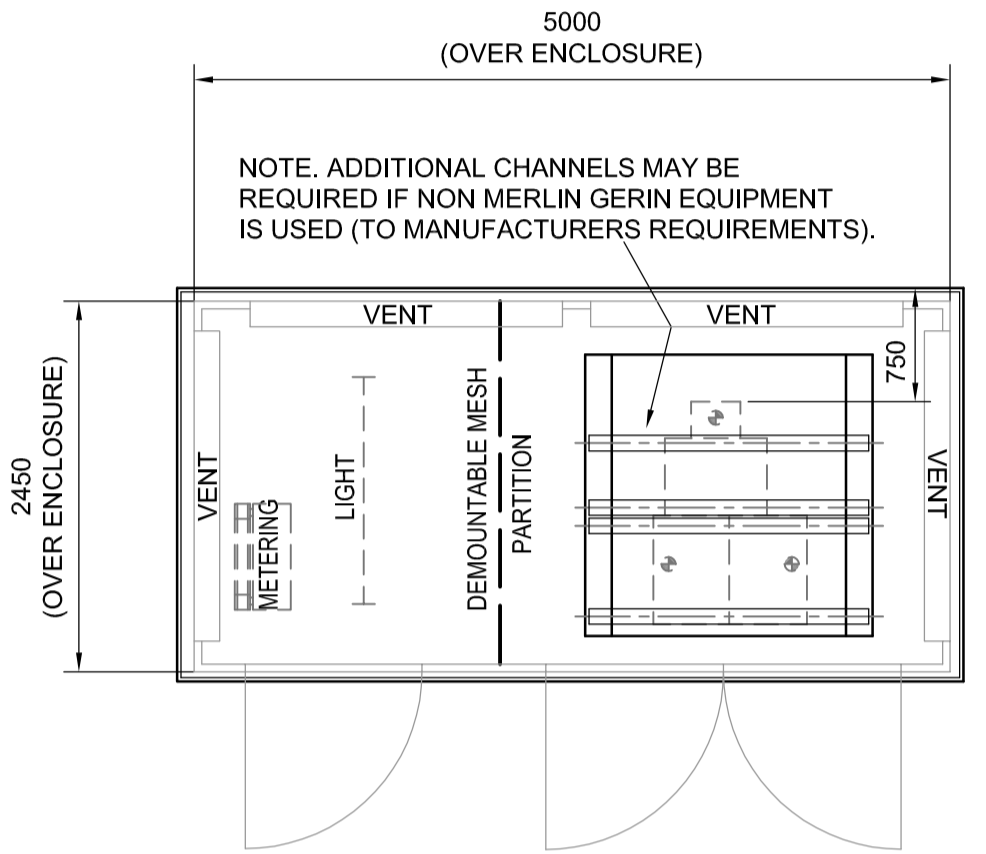
FRONT ELEVATION



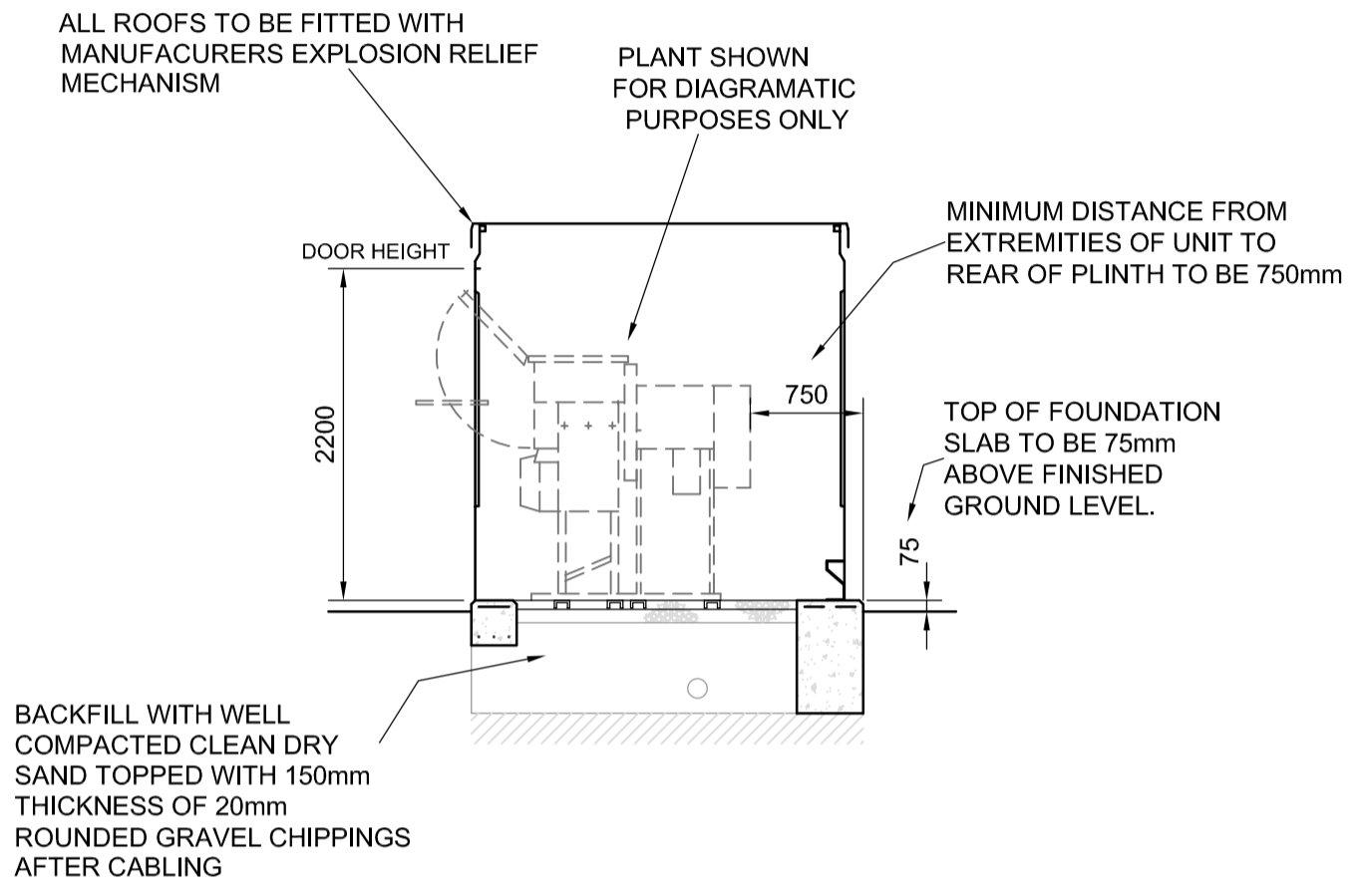
SIDE ELEVATION
OPPOSITE SIDE IDENTICAL



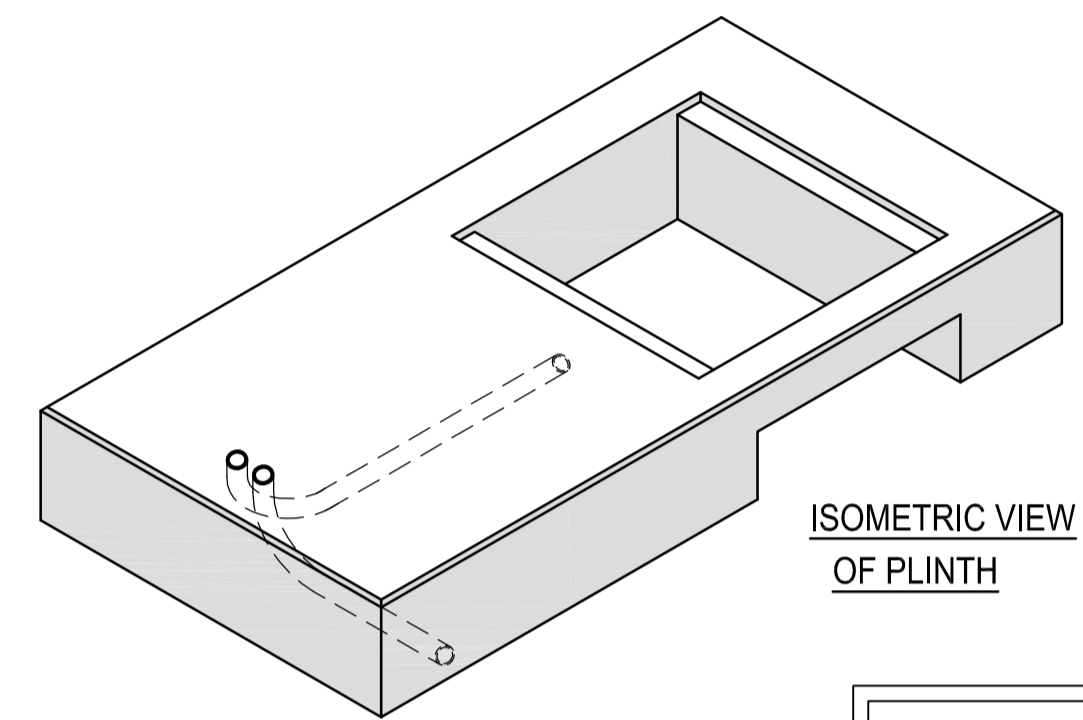
REAR ELEVATION



PLANT LAYOUT PLAN



PLANT SECTION



ISOMETRIC VIEW
OF PLINTH

ENCLOSURE ONLY SUITABLE WHEN
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NOTES

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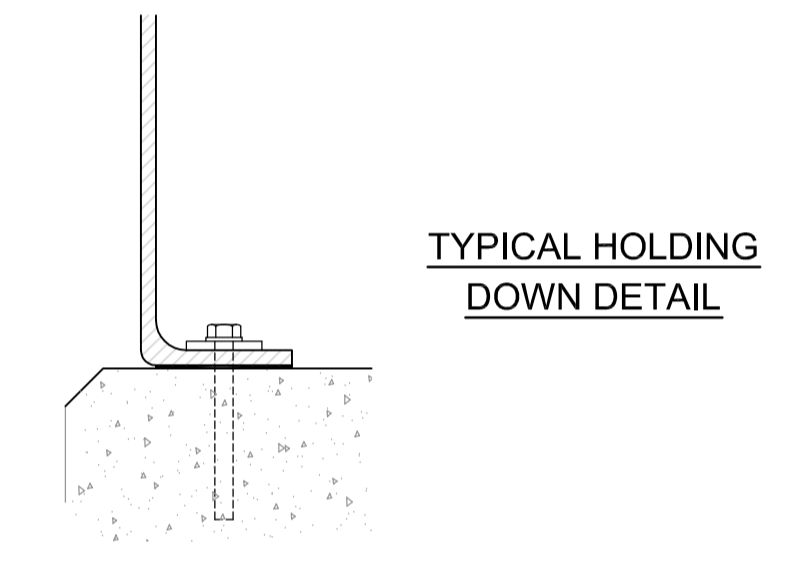
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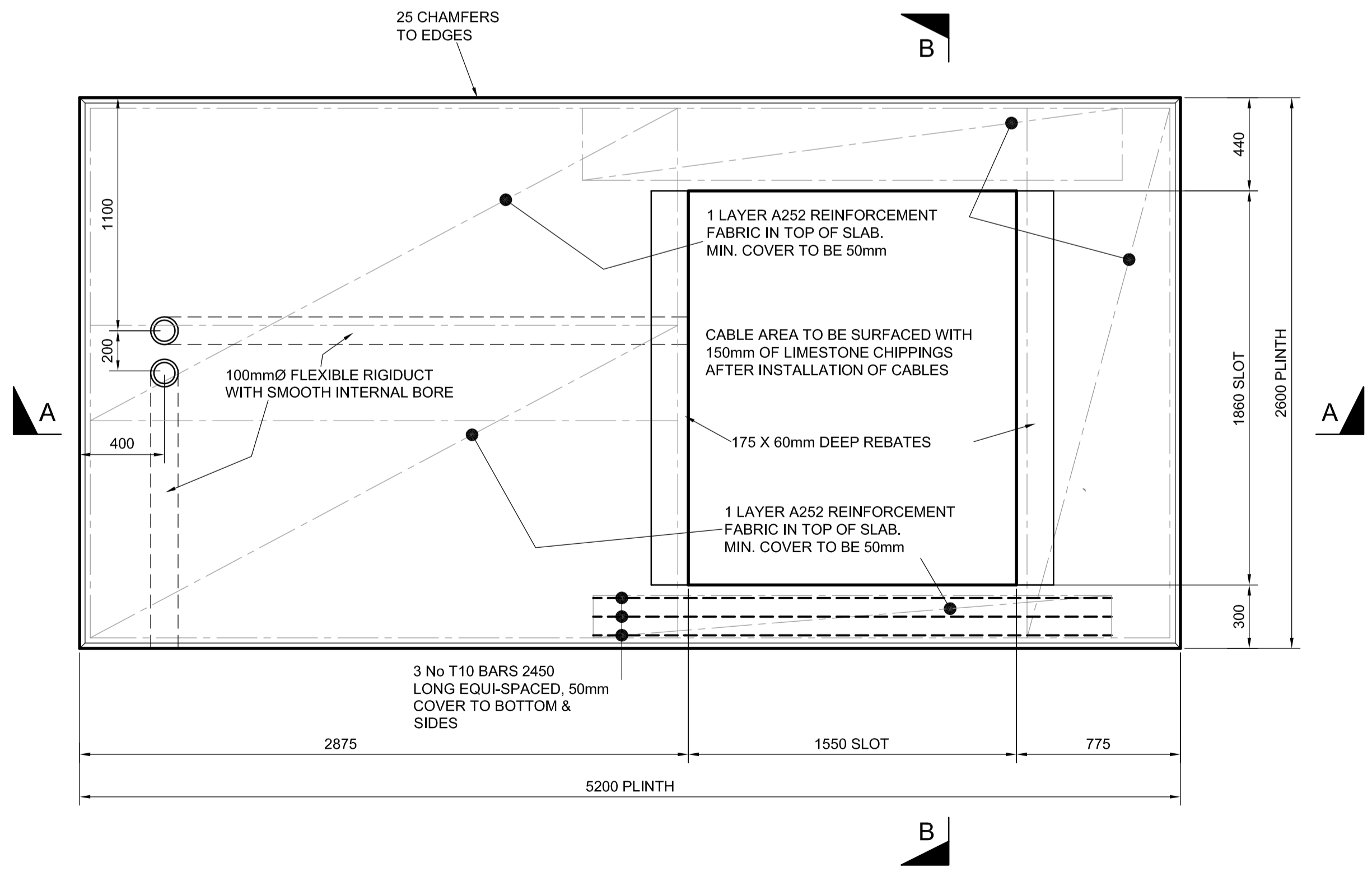
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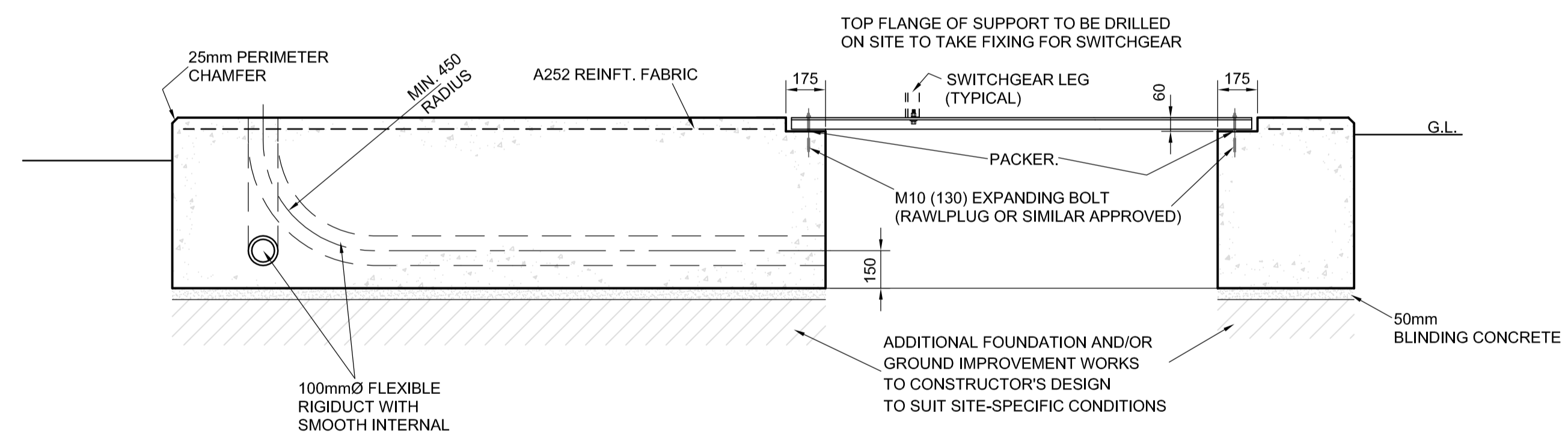
THIS DRAWING TO BE READ IN CONJUNCTION WITH SUB-03-017 'GENERAL SPECIFICATION FOR THE CIVIL ENGINEERING AND BUILDING DESIGN AND CONSTRUCTION OF SECONDARY SUBSTATIONS'



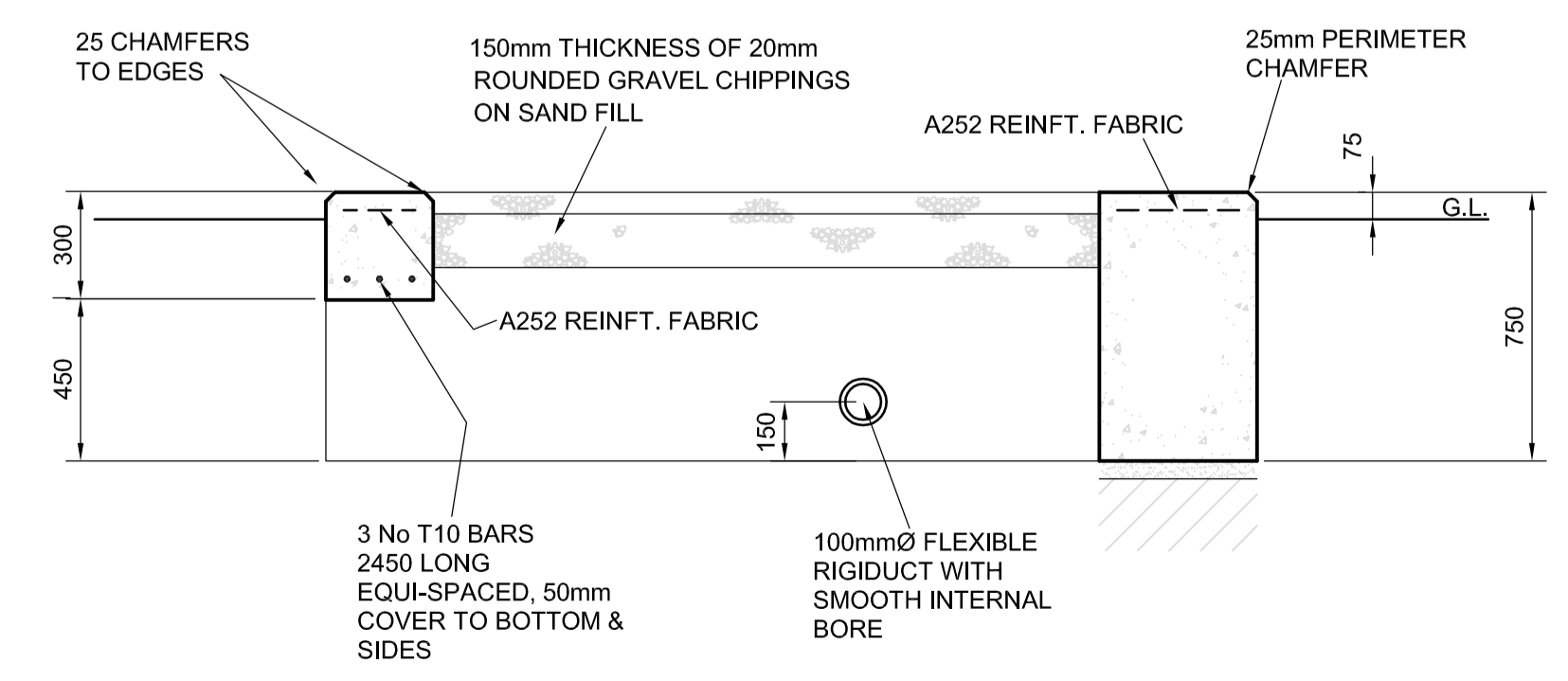
TYPICAL HOLDING
DOWN DETAIL



FOUNDATION PLAN
SCALE 1:20



SECTION A - A
SCALE 1:20



SECTION B - B
SCALE 1:20

Rev.	Date	UPDATED.
5.0	MAR.2010	
Drawn	M.T.	
Checked	C.W.	
Approved	A.J.R.	



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**TYPICAL FOUNDATION PLINTH FOR 11KV UNIT SUBSTATION
RMU WITH METERING, 5.0 X 2.5M GRP ENCLOSURE**

Location TYPICAL					
Drawn	Date	Checked	Date	Approved	Date
SPEN	27/03/96	SPEN	27/03/96	SPEN	27/03/96
Status FOR ISSUE			Drg. No. SP2142493	Rev. 5.0	Size A1
© Copyright property of SP PowerSystems Ltd.					Scale 1:50

NOTES

General

This drawing is to be read in conjunction with document SUB-03-017 General Specification for the Civil Engineering and Building Design and Construction of Secondary Substations. It is the constructor's responsibility to confirm, before construction, that the details on this drawing are correct as per SUB-03-017.

This is a generic guidance drawing that is deemed suitable for construction. However the constructor should consider all site specific risk that will affect the design and operation of the substation. Proposed substation details are to be submitted for acceptance before installation.

Details shown on this drawing are typical for this type of substation building but may not be suitable for substations housing alternative equipment. The constructor shall satisfy themselves that the appropriate details shown are correct depending on the type of substation being constructed.

Concrete

General

The concrete shall be in accordance with the specification and attain the relevant cub crushing strength at 28 days.

Foundations (Concrete 40N/mm² 28-Day Cube Strength)

Foundations are to be set on undisturbed inorganic strata that provide the required minimum design safe ground bearing capacity. Minimum bearing capacity to be 75kN/m².

Floor (Concrete 40N/mm² 28-Day Cube Strength)

A flat, level and smooth floor surface is essential for installation of plant. Tolerances to finished level expressed as a maximum permissible deviation beneath a straight edge with feet placed anywhere on the floor shall not exceed 1mm in 1m or 3mm in 3m. Floors to be cured, prepared & painted with 2 No. Coats of non-slip floor paint on completion.

Brickwork

General

All brickwork below D.P.C. to be H.D. category 1 min. 75N/mm² mean compressive strength and max 7% M.A. and durability designation F2 S2 (Ex Engineering Brickwork Class B) in English bond except for exposed faces.

External facing brickwork to be H.D. category 1 min. 30N/mm² mean compressive strength and max 12% M.A. and durability designation F1 S1 or better.

Internal facing brickwork to fair faced smooth textured solid concrete bricks, sized to match external facing bricks and with a mean compressive strength of not less than 20N/mm². Class iii mortar.

Walls

Walls shall be 215mm English garden wall bond or Collar jointed stretcher bond. Leaves of collar jointed double stretcher walls to be tied together by means of type 1 or type 2 stainless steel ties laid in every fourth course at 375mm centres and set back 38mm from outer face, ties are to be staggered.

Doors

Details of proposed doors shall be submitted to SPEN for comment, before work commences.

Proprietary GRP faced aluminium or steel security doors are the preferred option, unless stated otherwise.

An alternative option for hardwood doors (see Drg SP4000543 for details) or GRP doors is also available.

Cable Trench & Slots

On completion of cabling, cable trench and slots to be filled with dry sand topped with a minimum 150mm depth of rounded gravel chippings (top to be level with F.F.L.).

Roof

Standard Concrete Roofs (Concrete 40N/mm² 28-Day Cube Strength)

Wherever practicable, roofs should be cast in situ reinforced concrete construction with a soffit finish. Slip joints shall be incorporated at wall bearings, polysulphide sealed externally. Internal / External faces of concrete to be fair faced. All external faces to be cured, prepared, primed and finished with a two coat high performance (Aliphatic) polyurethane waterproofing system (flat roof grade) with glass fibre mat reinforcement to initial coat, e.g.

1No. Coat of LPL bonding primer then

2No. Coats of LPL Decothane.

Obtainable from Liquid Plastics Tel. 01772 259 781 or Equal System

All finishes are to be in accordance with the manufacturers recommendations.

Where permanent structural metal soffit shutters are used as part of a composite roof system these shall be corrosion resistant and the Constructor's proposals for screening or tagging for earthing purposes shall be expressly agreed with SPEN prior to construction.

Ventilation

Ventilation shown is typical for a single 500kVA transformer substation.

The typical ventilation indicated may not be adequate in certain supply conditions which might require additional or alternative ventilation arrangements.

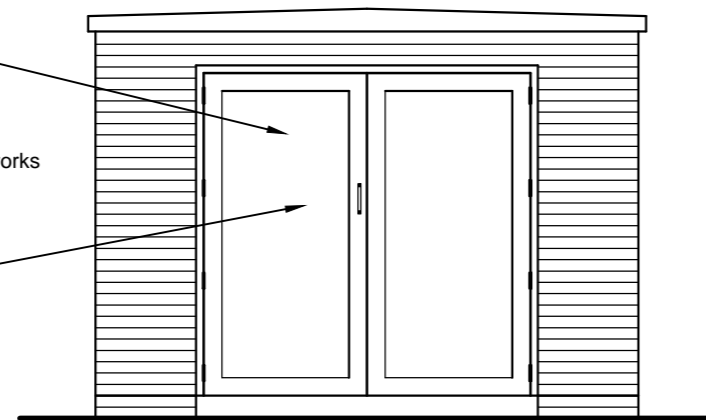
Related Typical Deemed to Satisfy Drawings

Hardwood Doors SP4000543
Meter Cupboards SP4078901
Vent for Brickbuilt substation SP4000542

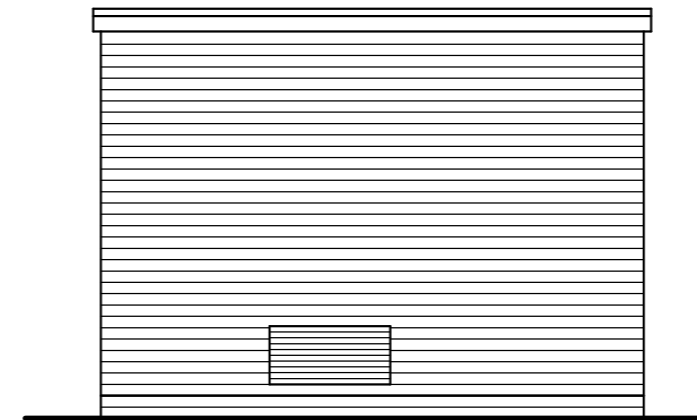
L.H. leaf to open first

NOTE

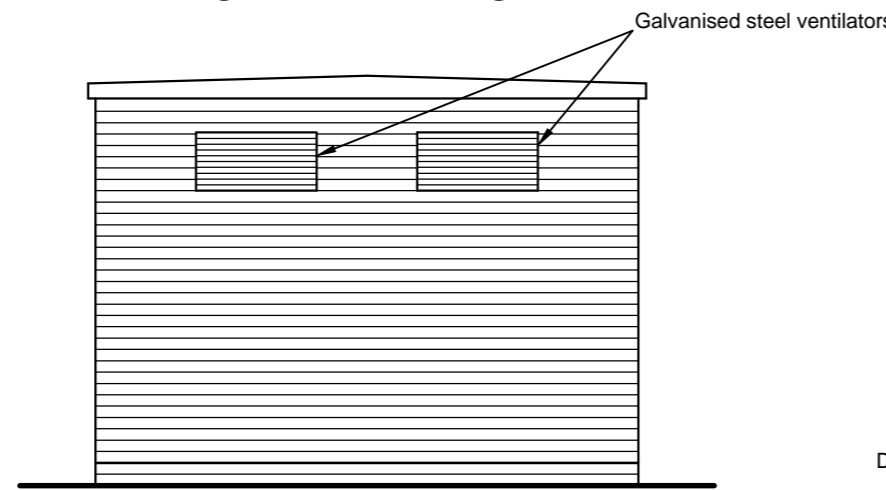
It is essential that EnergyNetworks personnel can access & properly secure on egress all doors at all times. Any hardwood, metalwork or GRP construction doors that may shrink, warp, wind, distort, corrode or bind will not be acceptable



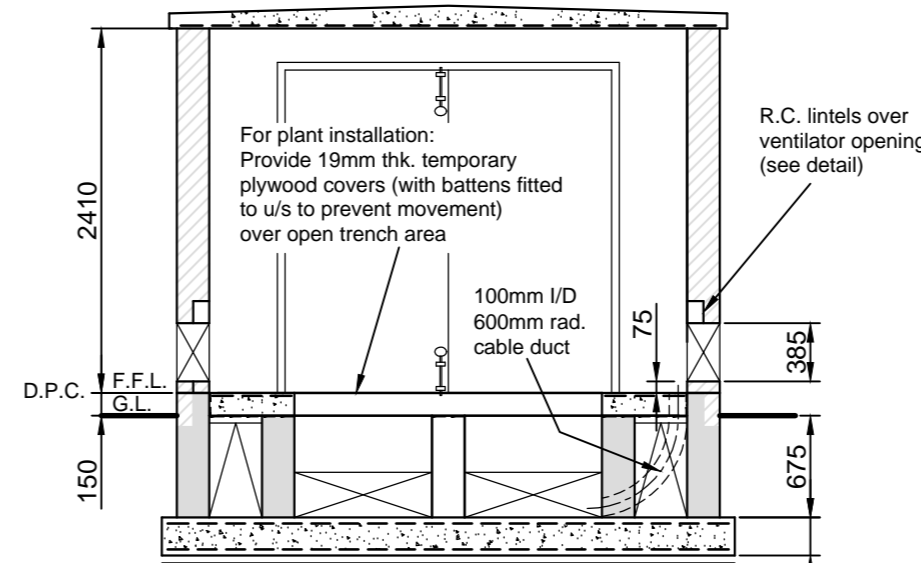
FRONT ELEVATION



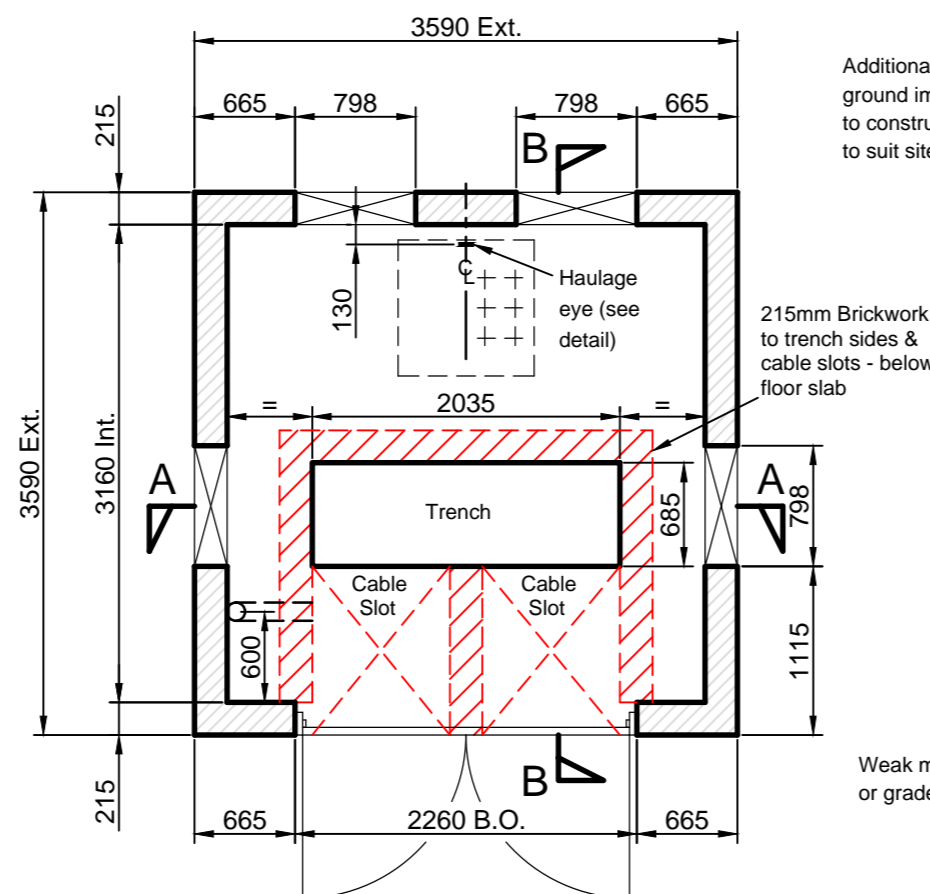
SIDE ELEVATION



REAR ELEVATION



SECTION A-A

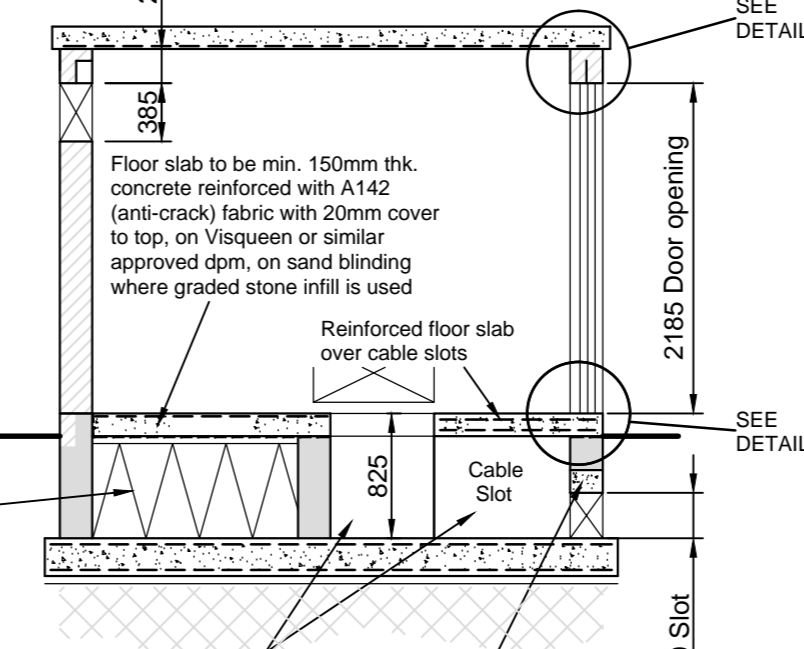


PLAN

Additional foundation and/or ground improvement works to constructors design to suit site-specific conditions

215mm Brickwork to trench sides & cable slots - below floor slab

Weak mix concrete or graded stone infill



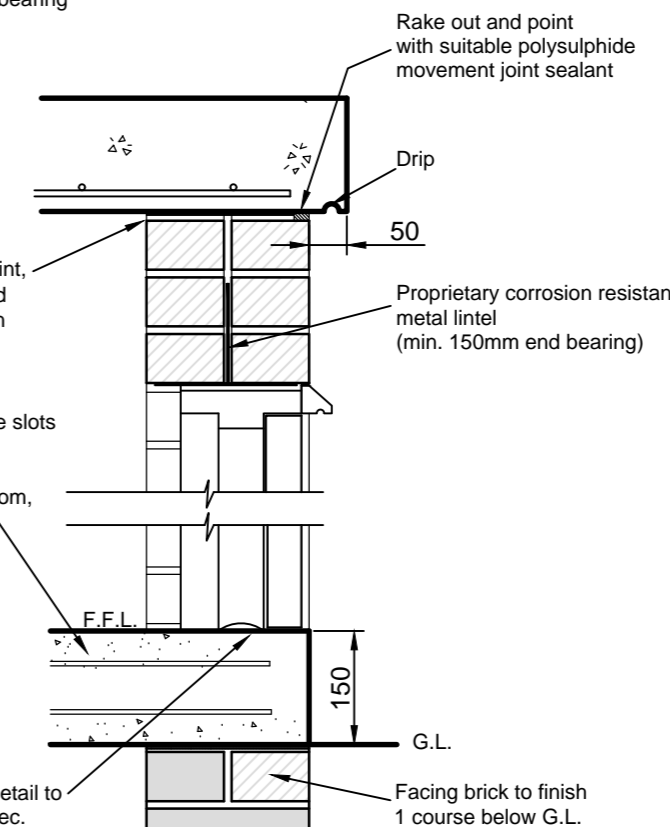
SECTION B-B

Cable trench & slots to be sand filled, trench topped with 150mm thickness of rounded gravel chippings (top to be level with F.F.L.)

R.C. lintels over cable slots min. 100mm bearing

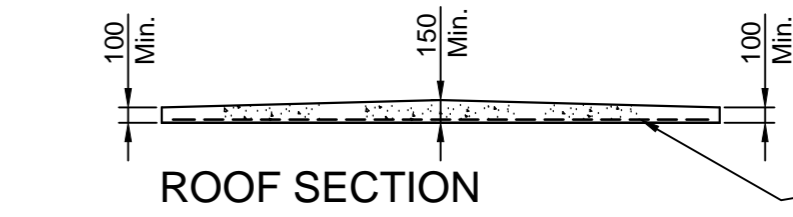
Concrete floor over cable slots to be reinforced with 2 sheets of A252 fabric - 1 sheet top, 1 sheet bottom, 40mm cover

DETAIL AT DOORWAY Scale 1:10



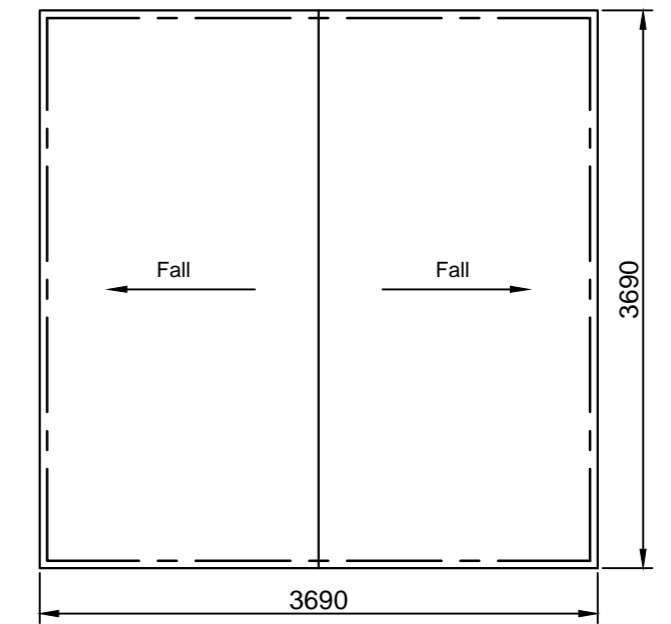
10mm Thk. cured bed joint, level and smooth, topped with 2 layers of Visqueen (or similar approved)

Threshold detail to suit door spec.

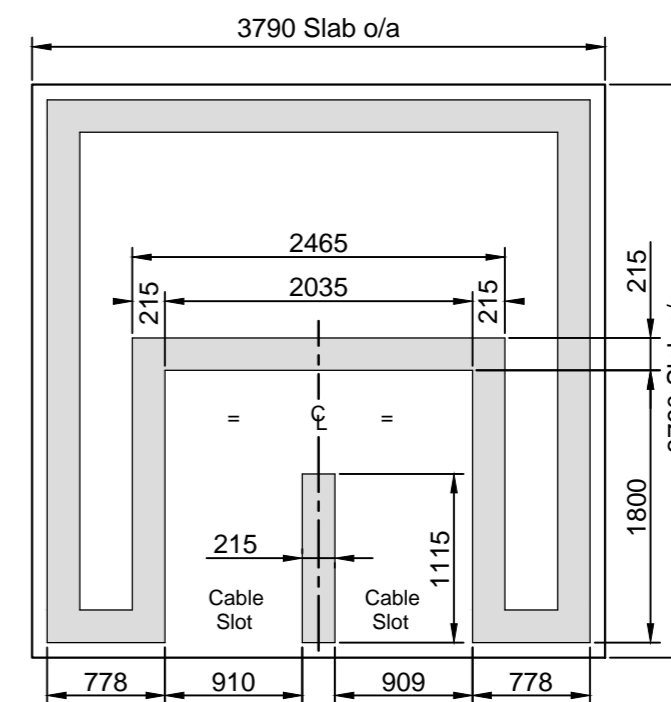


ROOF SECTION

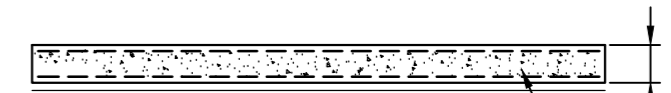
Roof reinf. min. A393 mesh with 75mm cover to sides and 20mm cover to bottom, laps to be 400mm



ROOF PLAN



PLAN OF BRICKWORK BELOW FLOOR SLAB



FOUNDATION SECTION

Concrete slab, reinforced with min. A393 fabric with 40mm cover to sides, top and bottom. Laps to be min. 400mm

Rev. 6.0	Date 27/11/17	GENERAL UPDATES TO REFLECT CHANGES TO CIVIL POLICY DOCUMENTS
Drawn C.B.		
Checked GR		
Approved GR		



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System Design, Drawing Office
3 Prenton Way, Prenton, CH43 3ET
Telephone 0151 6092491

Title
TYPICAL TRADITIONAL BUILDING DETAILS FOR 11kV BRICKBUILT SUBSTATION (CLOSE COUPLED GEAR)

Location
TYPICAL

Drawn M.T.	Date JAN.07	Checked C.W.	Date JAN.07	Approved A.J.R.	Date JAN.07
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Status
ISSUED

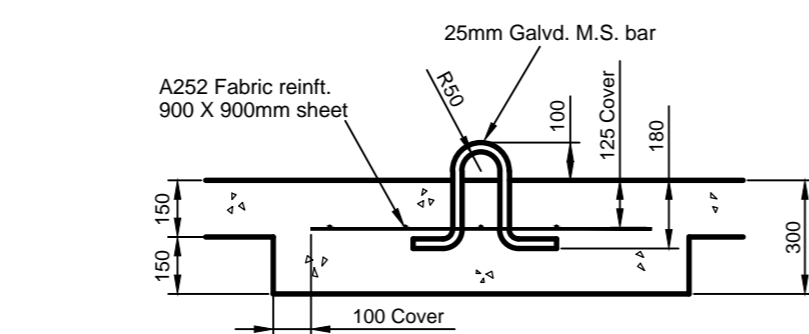
Drg. No.
SP3020357

Rev.
6.0

Scale
1:50

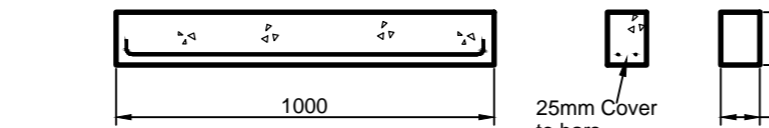
Size
A2

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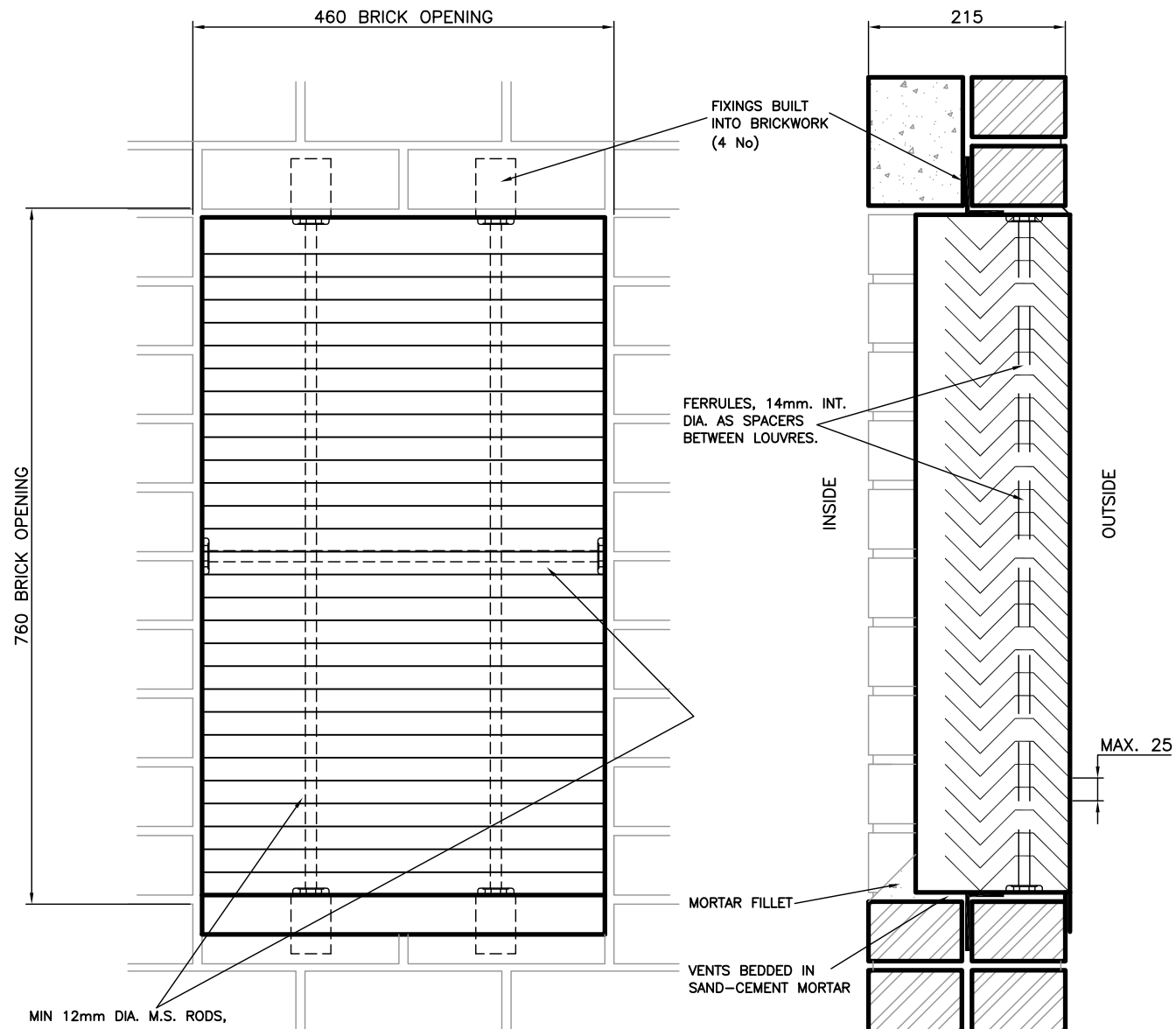


HAULGE EYE DETAIL Scale 1:20

Min. 2 No. 6mm dia. m.s. bars at 45mm centres (shape code 21 bar length 1040mm 'A'=940mm)



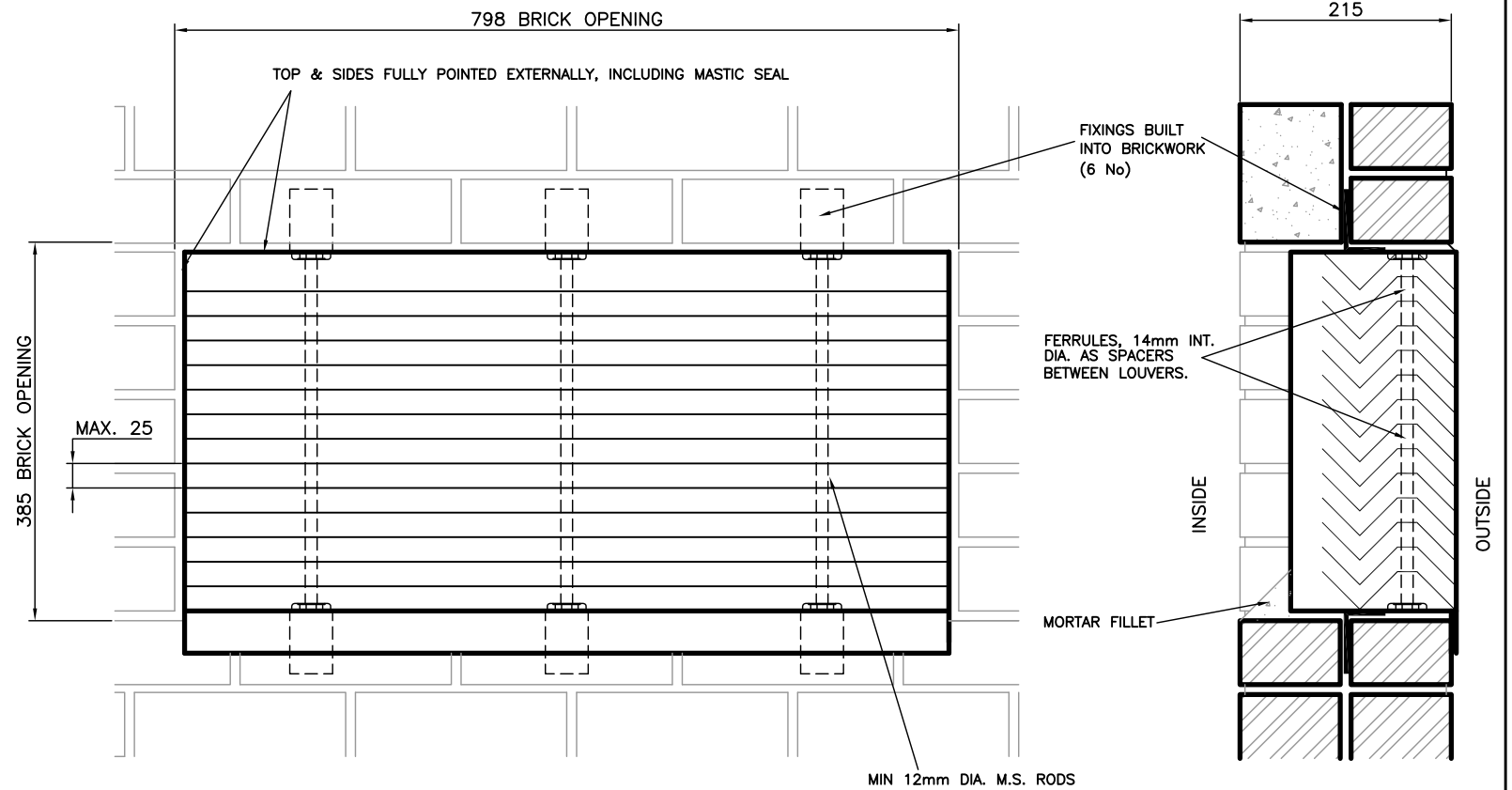
LINTOL TO VENT OPENING SCALE 1:20



EXTERNAL ELEVATION

VERTICAL SECTION

VERTICAL VENTILATOR



EXTERNAL ELEVATION

VERTICAL SECTION

HORIZONTAL VENTILATOR

VENTILATION SHOWN IS TYPICAL FOR A 500kVA TRANSFORMER. VENTILATION UNIT OPENING SIZES FOR 1000kVA TRANSFORMERS SHALL BE A MINIMUM 1002 X 450mm. TYPICAL VENTILATION INDICATED MAY NOT BE ADEQUATE IN CERTAIN SUPPLY CONDITIONS, WHICH MIGHT REQUIRE ADDITIONAL OR ALTERNATIVE VENTILATION ARRANGEMENTS.

THIS DRAWING TO BE READ IN CONJUNCTION WITH SUB-03-017 'GENERAL SPECIFICATION FOR THE CIVIL ENGINEERING AND BUILDING DESIGN AND CONSTRUCTION OF SECONDARY SUBSTATIONS'

NOTES:

1. NOT APPLICABLE TO HV SWITCHING STATIONS.
2. DRAWING TO BE READ IN CONJUNCTION WITH SP4000545, SP3020357, SP4053389 & SP4058664. TYPICAL TRADITIONAL BUILDING DETAILS FOR SECONDARY SUBSTATIONS (NOT APPLICABLE TO HV SWITCHING STATIONS).
3. THIS DRAWING TO BE READ IN CONJUNCTION WITH SUB-03-017 'GENERAL SPECIFICATION FOR THE CIVIL ENGINEERING AND BUILDING DESIGN AND CONSTRUCTION OF SECONDARY SUBSTATIONS'.

ADEQUATE NATURAL VENTILATION SHALL BE PROVIDED TO DISSIPATE HEAT GENERATED BY TRANSFORMERS AND TO PREVENT CONDENSATION. DESIGNERS SHOULD REFER TO SUB-02-006 ("SECONDARY SUBSTATION INSTALLATION AND COMMISSIONING SPECIFICATION") FOR TYPICAL TRANSFORMER HEAT GENERATION VALUES.

VENTILATION UNITS SHALL BE OF ROBUST VANDAL & CORROSION RESISTANT CONSTRUCTION, OFFERING THE SPECIFIED DEGREE OF PROTECTION FROM WATER INGRESS AND LONG OBJECT PROBES WHICH MAY HAVE THE POTENTIAL TO INFRINGE ELECTRICAL SAFETY

INTUMESCENT VENTILATION UNITS SHALL BE PROVIDED WHERE SEGREGATION IN THE EVENT OF FIRE IS REQUIRED.

VENTILATORS MANUFACTURED FROM MIN. 18 GAUGE, (1.2mm) GALVANISED M.S. ALL PARTS TO BE HOT DIPPED GALVANISED IN ACCORDANCE WITH THE SPECIFICATION BEFORE ASSEMBLY.

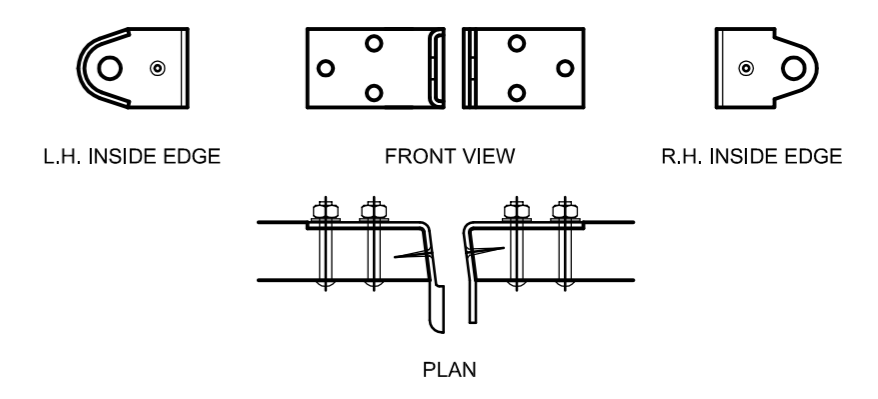
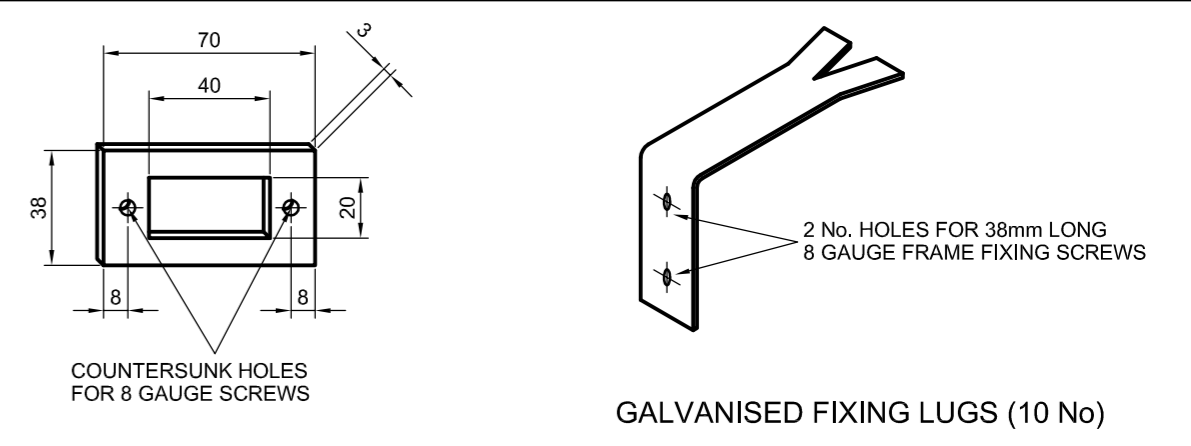
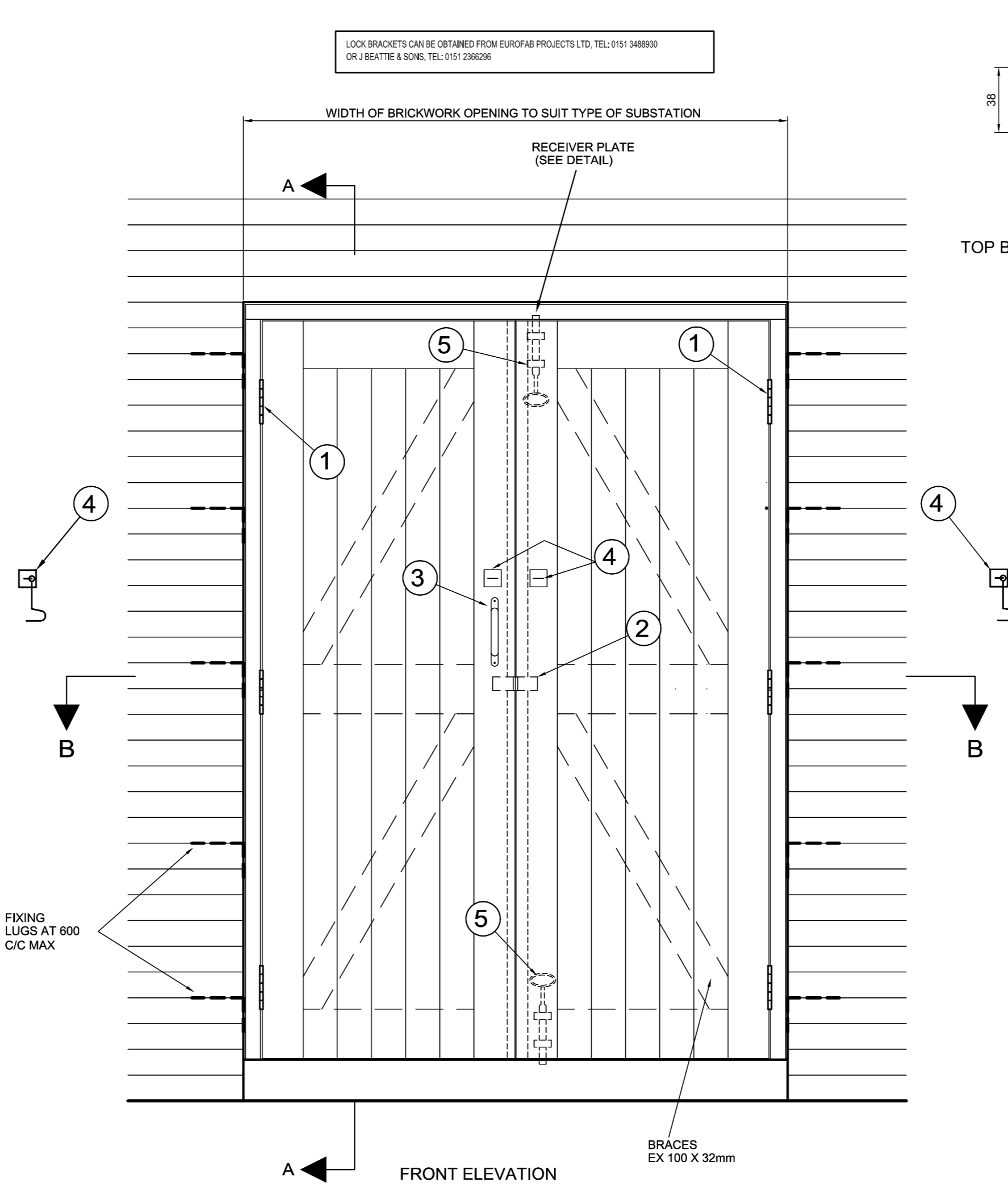
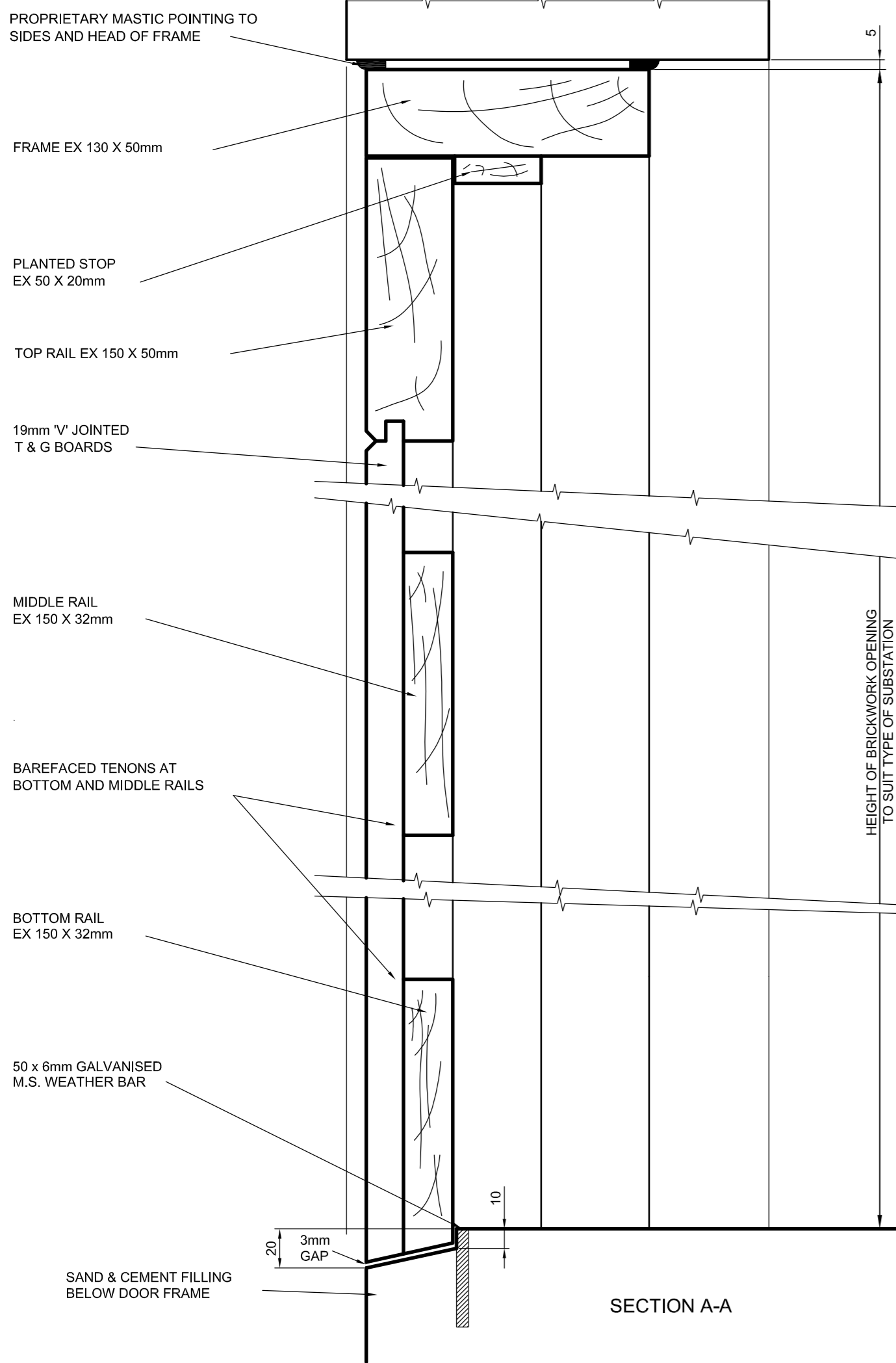
ALL DIMENSIONS ON THIS DRAWING ARE IN MILLIMETRES UNLESS OTHERWISE STATED.



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System Design, Drawing Office
3 Prenton Way, Prenton, CH43 3ET
Telephone 0151 6092491

Title
TYPICAL 'Z' VENT LOUVRED VENTILATION UNITS FOR SECONDARY SUBSTATION BUILDINGS HOUSING INDOOR EQUIPMENT

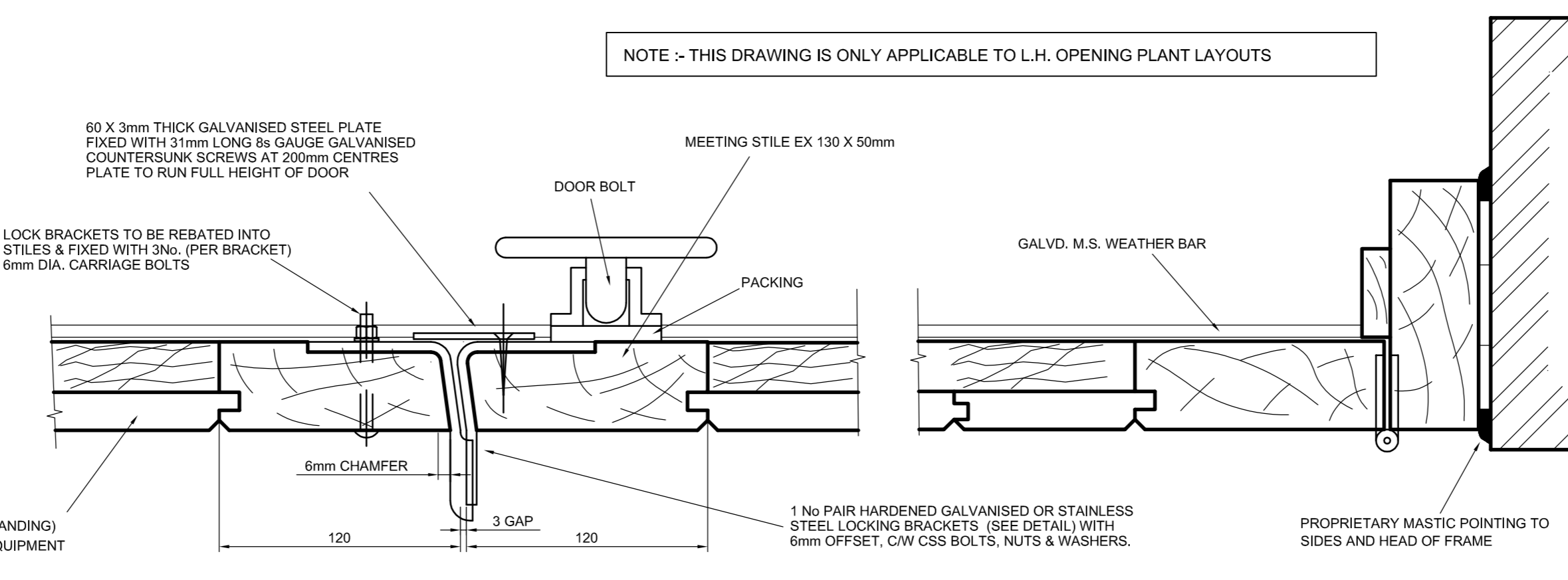
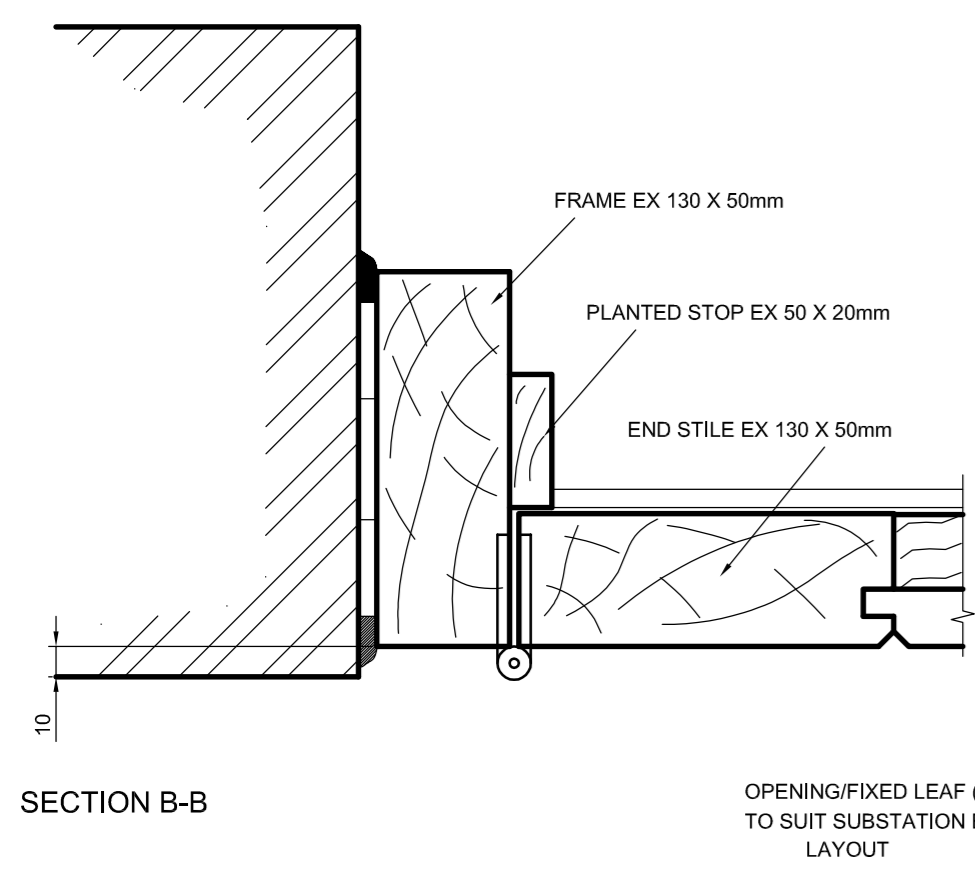
Location TYPICAL					
Drawn L.A.	Date 12/4/06	Checked M.T.	Date 12/4/06	Approved A.J.R.	Date 12/4/06
Status FOR ISSUE			Drg. No. SP4000542		Rev. 5.0
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TIMBER SIZES		
MEMBER	NOM. SIZE	FINISHED SIZE
FRAME	130 X 50	124 X 44
STOP	50 X 20	44 X 14
END STILES	130 X 50	124 X 44
MEETING STILES	130 X 50	124 X 44
TOP RAIL	150 X 50	144 X 44
MIDDLE RAIL	150 X 32	144 X 26
BOTTOM RAIL	150 X 32	144 X 26
BRACES	100 X 32	94 X 26
BOARDS	19mm T&G V' JOINTED	

FURNITURE	
1	3 PAIRS 102 X 76 X 6 mm STAINLESS STEEL BUTT HINGES
2	1 PAIR HARDENED GALVANISED STAINLESS STEEL LOCK BRACKETS
3	1 No. GALVANISED SOLID STEEL (NOT TUBULAR) HEAVY PATTERN DOOR PULL
4	2 No. GALVANISED HEAVY PATTERN CABIN HOOKS & STAPLES
5	2 No. SO. PATTERN BOW HANDLE STEEL GALV DOOR BOLTS WITH GALVANISED METAL RECEIVER TO FRAME HEAD

- NOTES**
1. MOISTURE CONTENT OF TIMBER NOT TO EXCEED $\pm 10\%$ OF THE AVERAGE EQUILIBRIUM MOISTURE CONTENT VALUE.
 2. JOINTS TO BE MORTICE & TENON, ASSEMBLED WITH WATERPROOF COLD WATER GLUE.
 3. ALL TIMBER TO BE APPROVED HARDWOOD - WEST AFRICAN IROKO OR OTHER HARDWOOD HAVING EQUAL OR BETTER PROPERTIES WITH RESPECT TO DURABILITY, RESISTANCE TO DECAY, RESISTANCE TO VANDALISM, RESISTANCE TO FIRE AND DIMENSIONAL STABILITY (SHRINKAGE/SWELLING).
- IT IS ESSENTIAL THAT ENERGY NETWORKS PERSONNEL CAN ACCESS & PROPERLY SECURE ON EGRESS ALL DOORS AT ALL TIMES. ANY JOINERY THAT MAY SHRINK, WARP, WIND OR DISTORT WILL NOT BE ACCEPTABLE.
- THIS DRAWING TO BE READ IN CONJUNCTION WITH SPECIFICATION DOCUMENT SUB-03-017 ('GENERAL SPECIFICATION FOR THE CIVIL ENGINEERING & BUILDING DESIGN & CONSTRUCTION OF SECONDARY SUBSTATIONS.')



NOTE :- THIS DRAWING IS ONLY APPLICABLE TO L.H. OPENING PLANT LAYOUTS

SP ENERGY NETWORKS

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System Design, Drawing Office
3 Prenton Way, Prenton, CH43 3ET
Telephone 0151 6092491

Rev. 4.0	Date MAR.2010	UPDATED.
Drawn M.T.	Checked C.W.	Approved A.J.R.

TYPICAL HARDWOOD DOOR CONSTRUCTION DETAILS FOR SECONDARY SUBSTATIONS.

Location TYPICAL	Drawn L.A.	Date 13/4/06	Checked M.T.	Date 13/4/06	Approved A.J.R.	Date 13/4/06
Status FOR ISSUE	Drg. No. SP4000543		Rev. 4.0		Scale N.T.S.	

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NOTES

General
This drawing is to be read in conjunction with document SUB-03-017 General Specification for the Civil Engineering and Building Design and Construction of Secondary Substations. It is the constructor's responsibility to confirm, before construction, that the details on this drawing are correct as per SUB-03-017.

This is a generic guidance drawing that is deemed suitable for construction. However the constructor should consider all site specific risk that will affect the design and operation of the substation. Proposed substation details are to be submitted for acceptance before installation.

Details shown on this drawing are typical for this type of substation building but may not be suitable for substations housing alternative equipment. The constructor shall satisfy themselves that the appropriate details shown are correct depending on the type of substation being constructed.

Concrete
General
The concrete shall be in accordance with the specification and attain the relevant cube crushing strength at 28 days.

Foundations (Concrete 40N/mm² 28-Day Cube Strength)
Foundations are to be set on undisturbed inorganic strata that provide the required minimum design safe ground bearing capacity. Minimum bearing capacity to be 75kN/m².

Floor (Concrete 40N/mm² 28-Day Cube Strength)
Floors of substations housing indoor switchgear shall have a visqueen damp proof membrane installed where graded stone infill is used.
A flat, level and smooth floor surface is essential for installation of plant. Tolerances to finished level expressed as a maximum permissible deviation beneath a straight edge with feet placed anywhere on the floor shall not exceed 1mm in 1m or 3mm in 3m. Floors to be cured, prepared & painted with 2 No. Coats of non-slip floor paint on completion.

Brickwork
General
All brickwork below D.P.C. to be H.D. category 1 min. 75N/mm² mean compressive strength and max 7% M.A. and durability designation F2 S2 (Ex Engineering Brickwork Class B) in English bond except for exposed faces.
External facing brickwork to be H.D. category 1 min. 30N/mm² mean compressive strength and max 12% M.A. and durability designation F1 S1 or better.
Internal facing brickwork to fair faced smooth textured solid concrete bricks, sized to match external facing bricks and with a mean compressive strength of not less than 20N/mm². Class iii mortar.

Walls
Walls shall be 215mm English garden wall bond or Collar jointed stretcher bond.
Leaves of collar jointed double stretcher walls to be tied together by means of type 1 or type 2 stainless steel ties laid in every fourth course at 375mm centres and set back 38mm from outer face, ties are to be staggered.

Doors
Details of proposed doors shall be submitted to SPEN for comment, before work commences. Proprietary GRP faced aluminium or steel security doors are the preferred option, unless stated otherwise.
An alternative option for hardwood doors (see Drg SP4000543 for details) or GRP doors is also available.

Cable Trench & Slots/Ramp
On completion of cabling, cable trench to be filled with dry sand and skimmed with minimum 50mm depth of sand/cement screed over a visqueen membrane (top to be level with FFL).

Roof
Standard Concrete Roofs (Concrete 40N/mm² 28-Day Cube Strength)
Wherever practicable, roofs should be cast in situ reinforced concrete construction with a soffit finish. Slip joints shall be incorporated at wall bearings, polysulphide sealed externally. Internal / External faces of concrete to be fair faced. All external faces to be cured, prepared, primed and finished with a two coat high performance (Aliphatic) polyurethane waterproofing system (flat roof grade) with glass fibre mat reinforcement to initial coat, e.g.

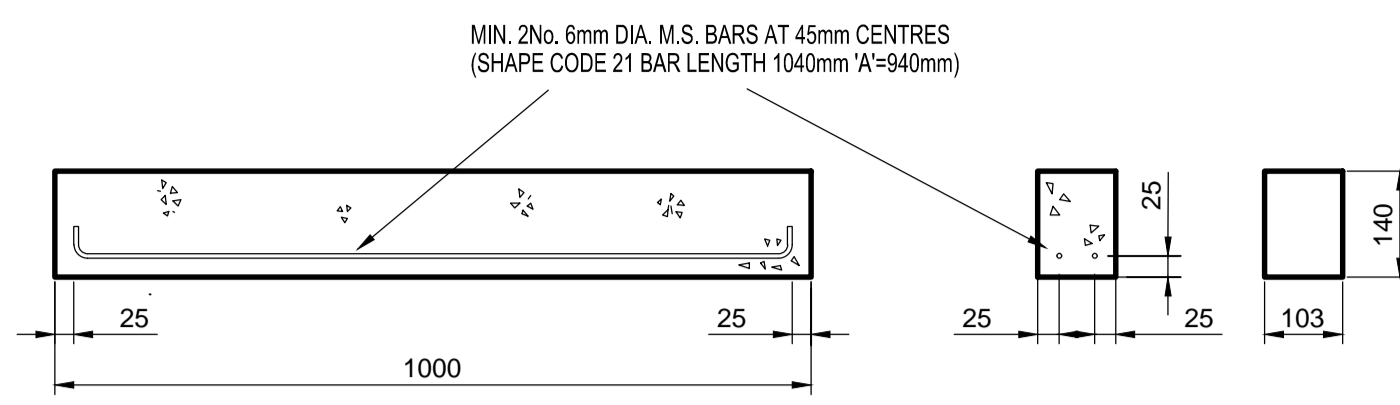
1.No. Coat of LPL bonding primer then
2.No. Coats of LPL Decothane.

Obtainable from Liquid Plastics Tel. 01772 259 781 or Equal System
All finishes are to be in accordance with the manufacturers recommendations.

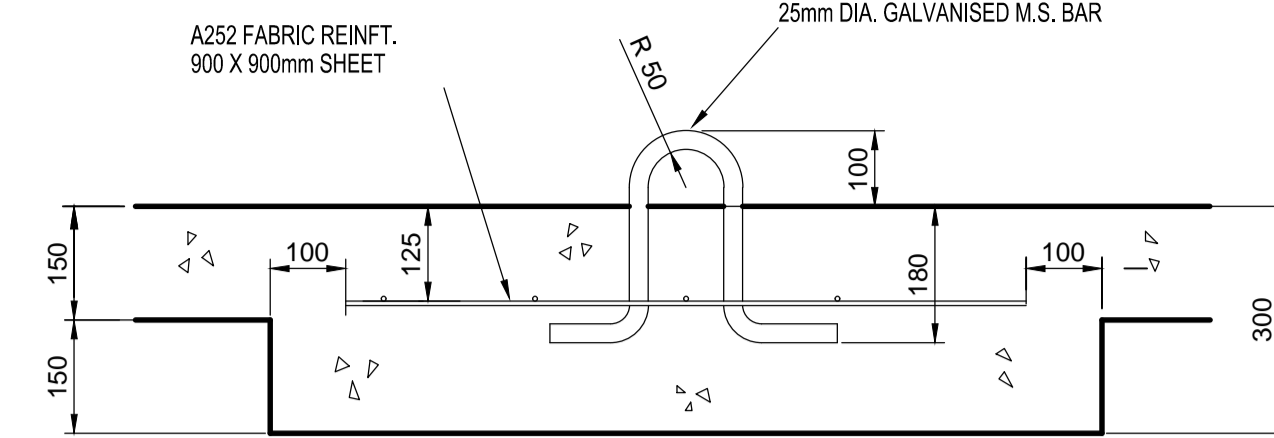
Where permanent structural metal soffit shutters are used as part of a composite roof system these shall be corrosion resistant and the Constructor's proposals for screening or tagging for earthing purposes shall be expressly agreed with SPEN prior to construction.

Ventilation
Ventilation shown is typical for a single 500kVA transformer substation.
The typical ventilation indicated may not be adequate in certain supply conditions which might require additional or alternative ventilation arrangements.

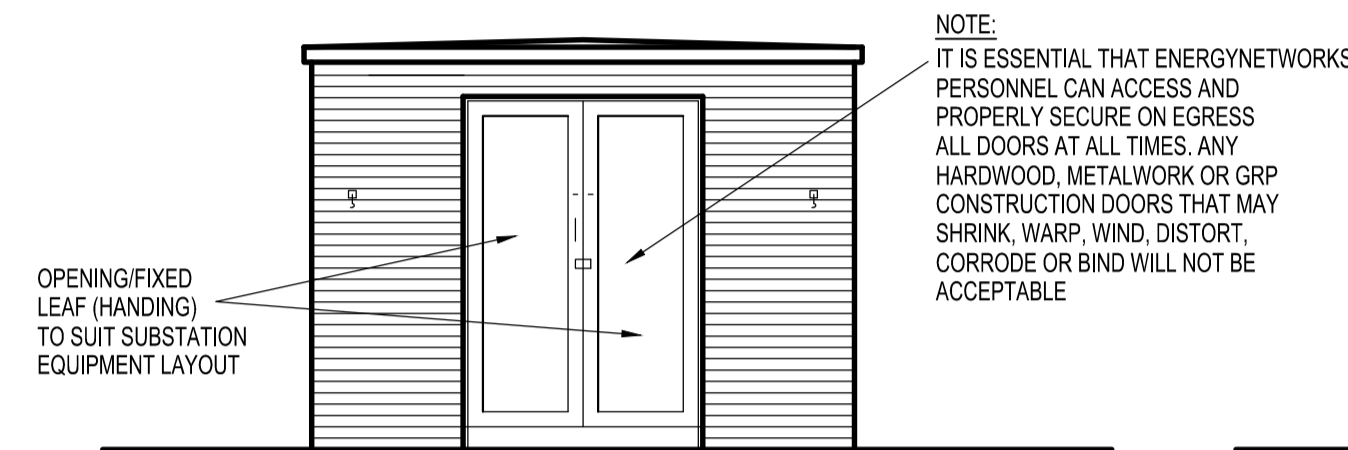
Related Typical Deemed to Satisfy Drawings
Hardwood Doors SP4000543
Meter Cupboards SP4078901
Vent for Brickbuilt substation SP4000542



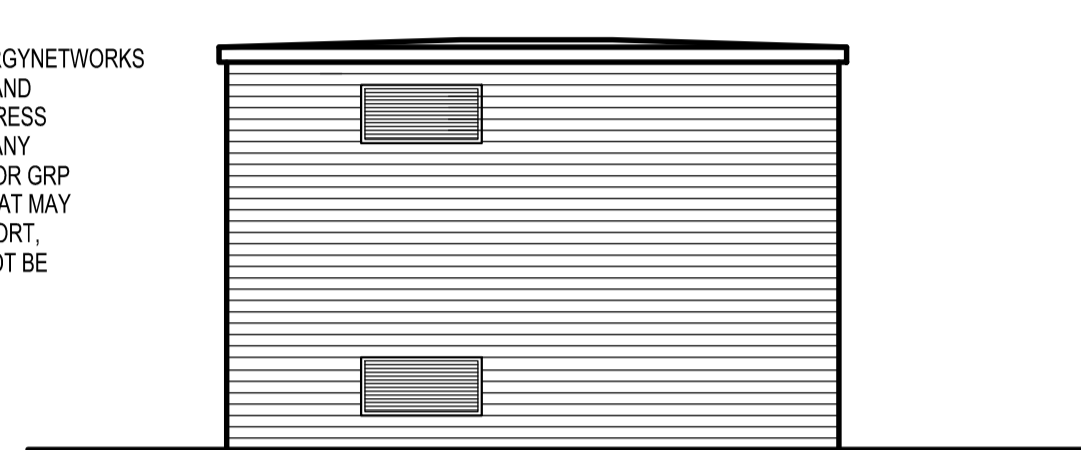
LINTOL TO VENT OPENING SCALE 1:10



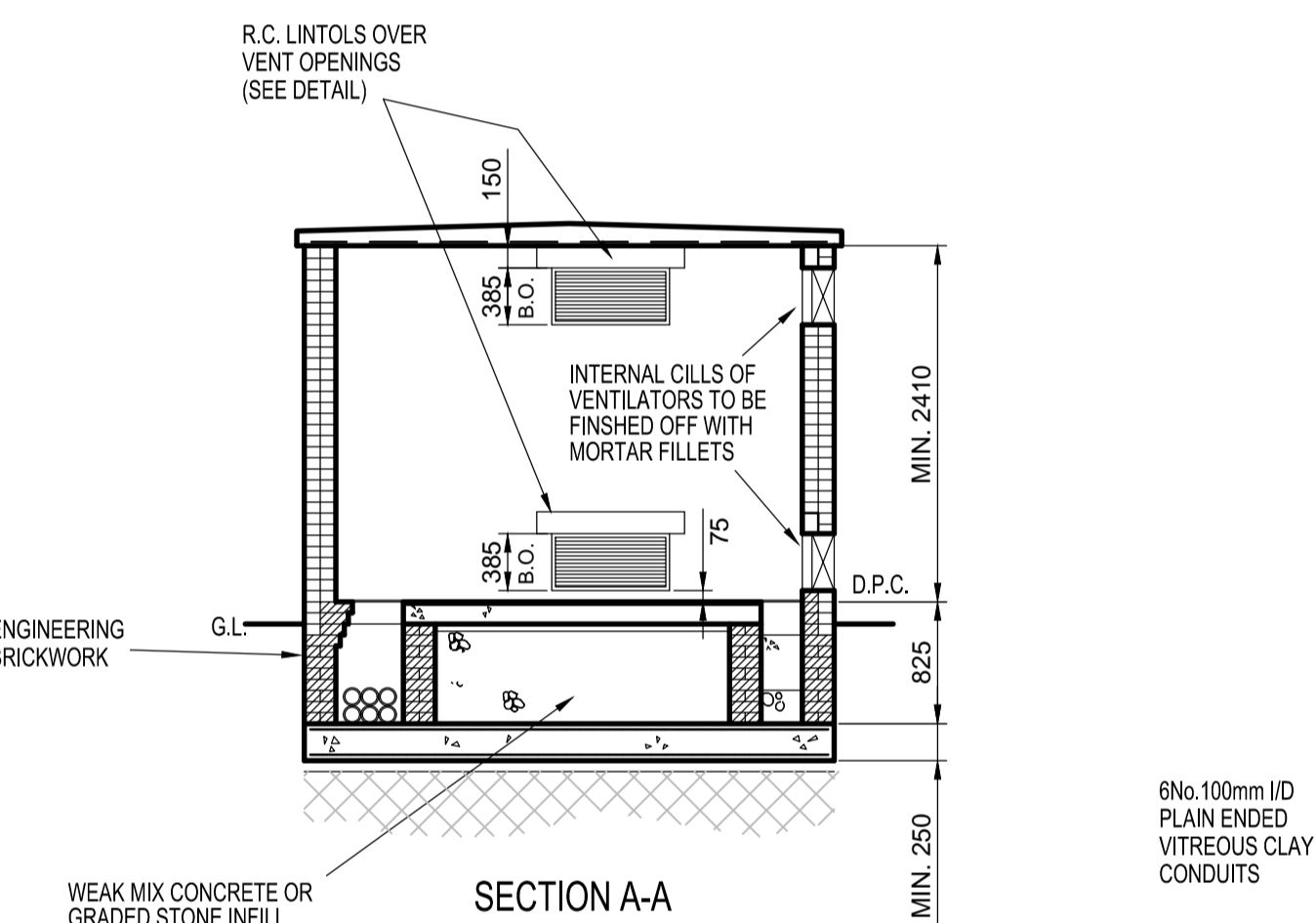
DETAIL OF HAULAGE EYE SCALE 1:10



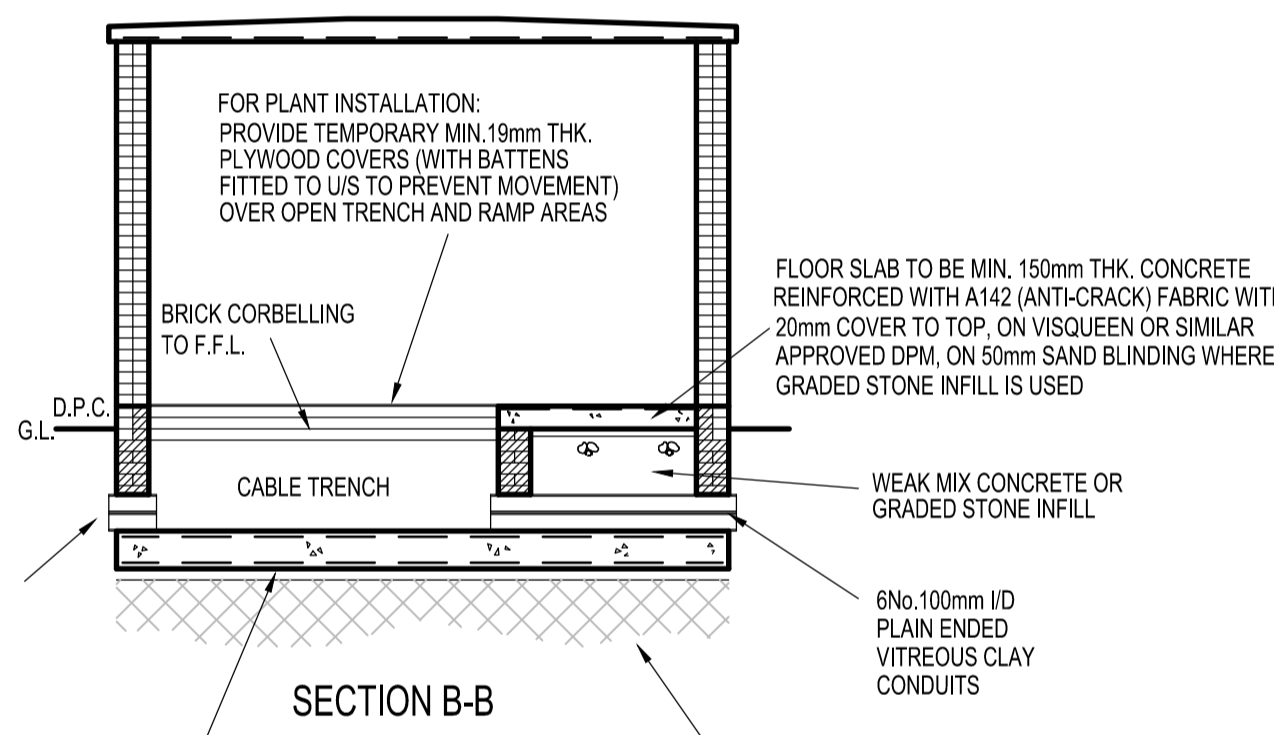
FRONT ELEVATION



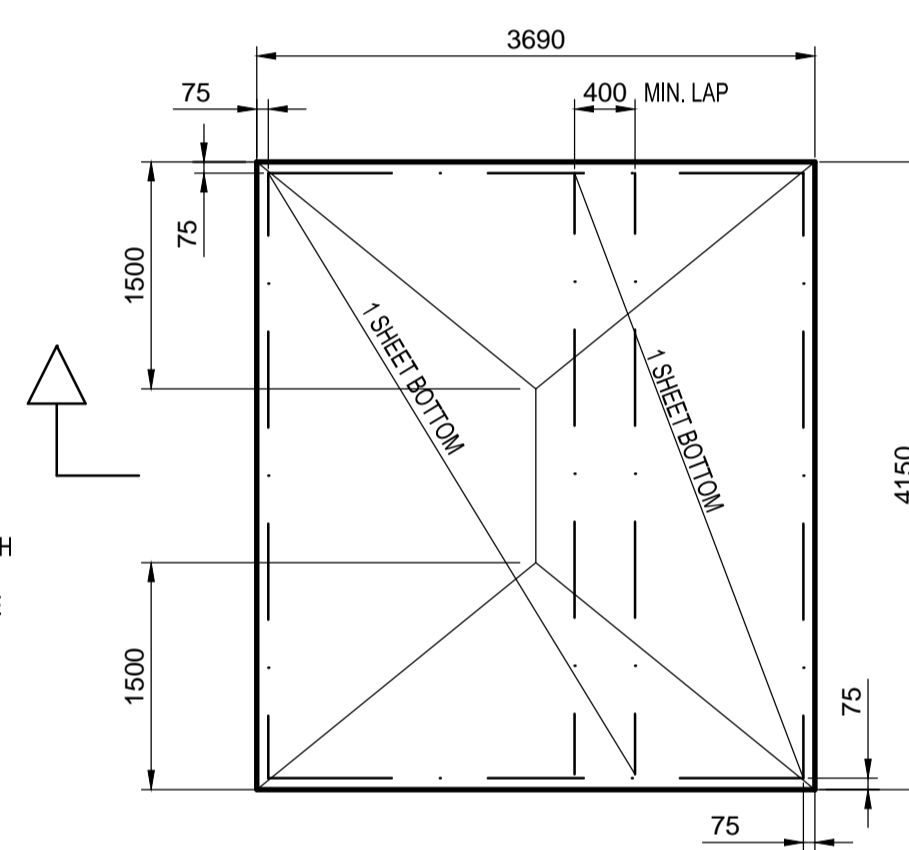
SIDE ELEVATION



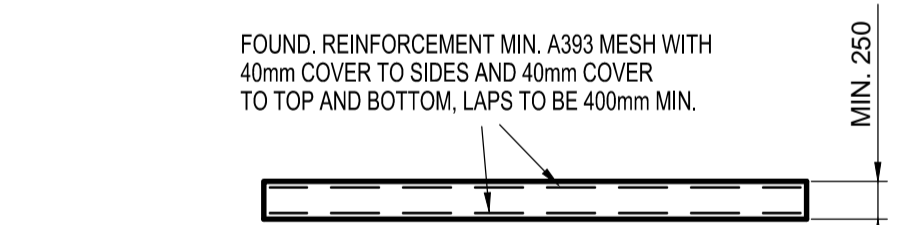
SECTION A-A



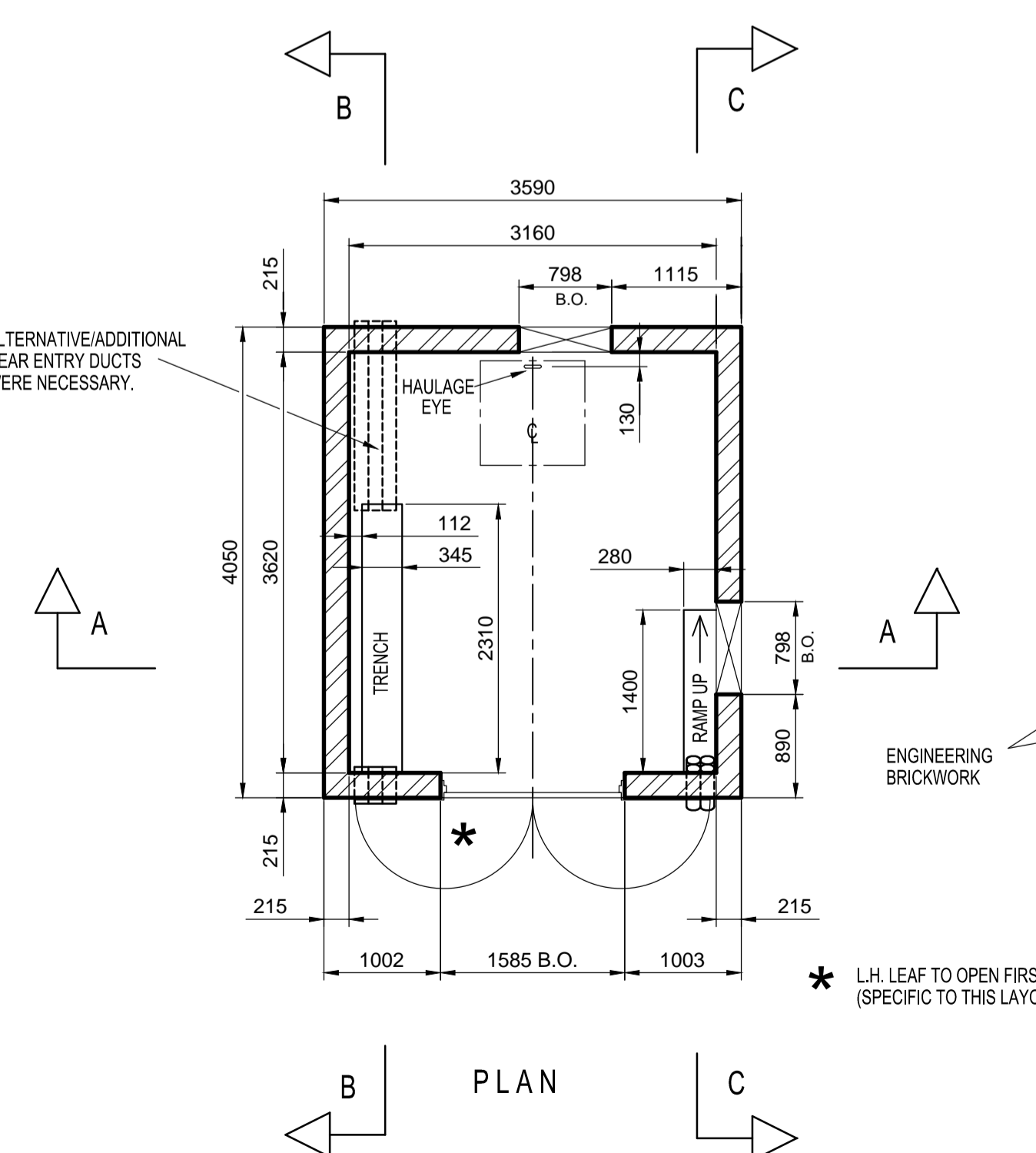
SECTION B-B



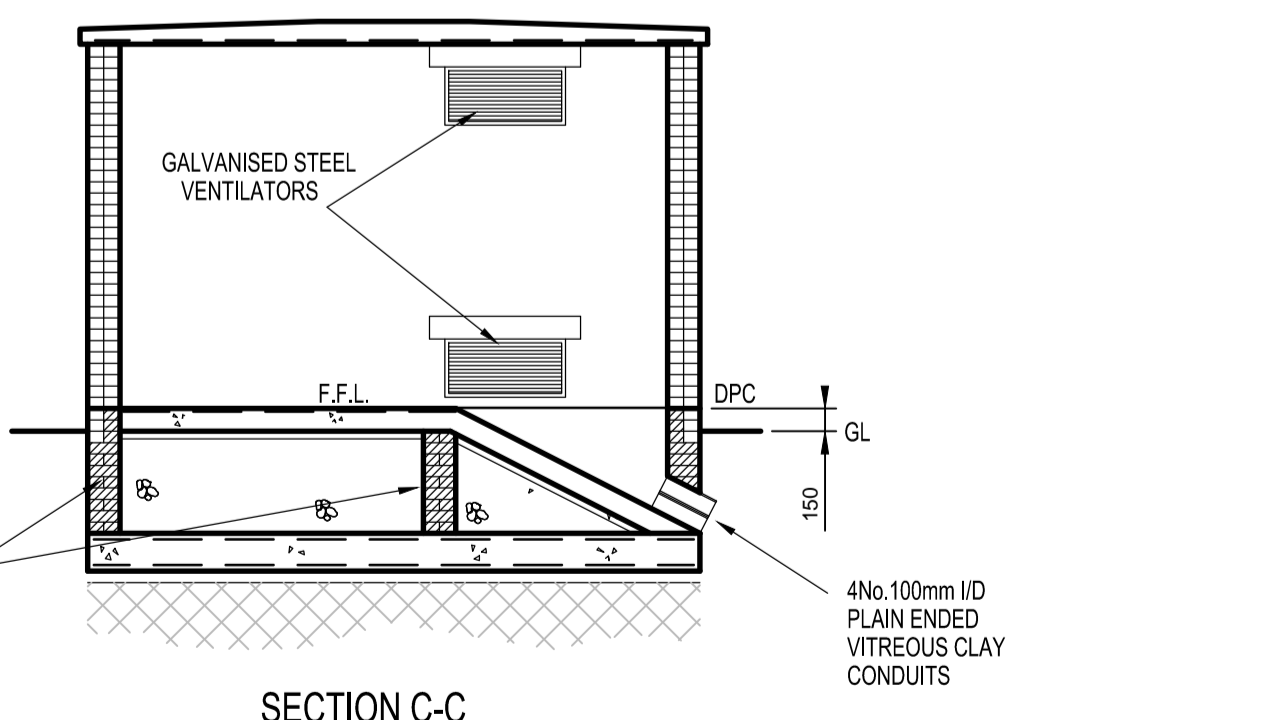
ROOF PLAN



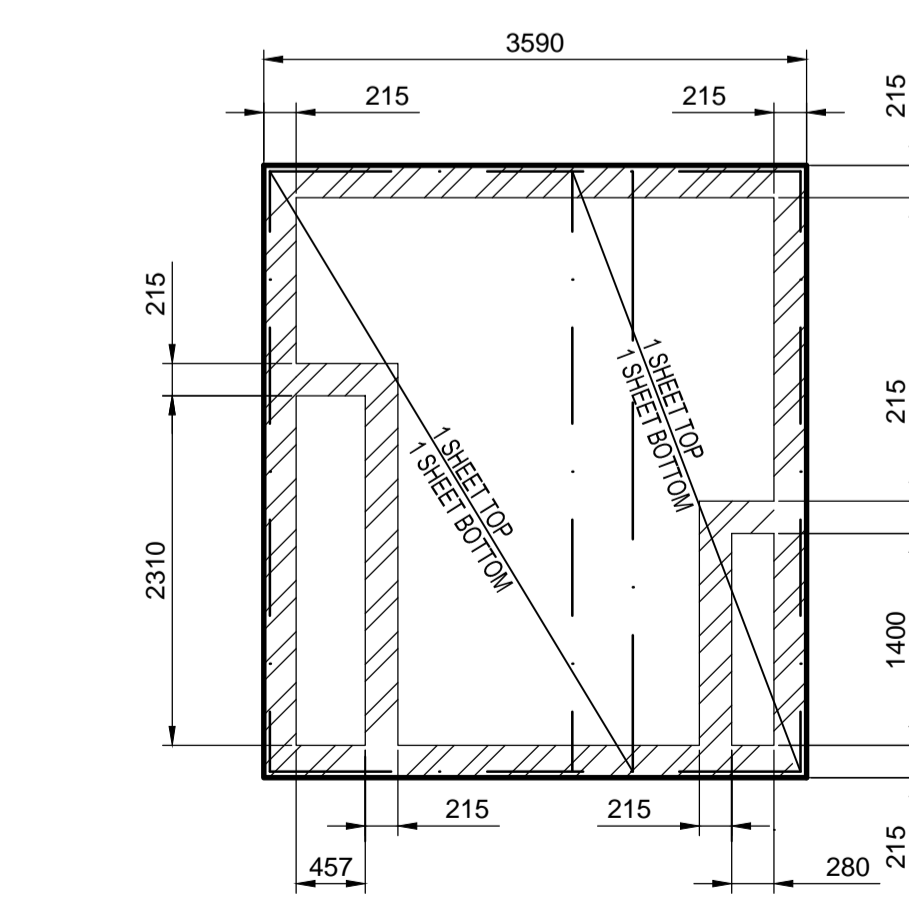
FOUNDATION SECTION



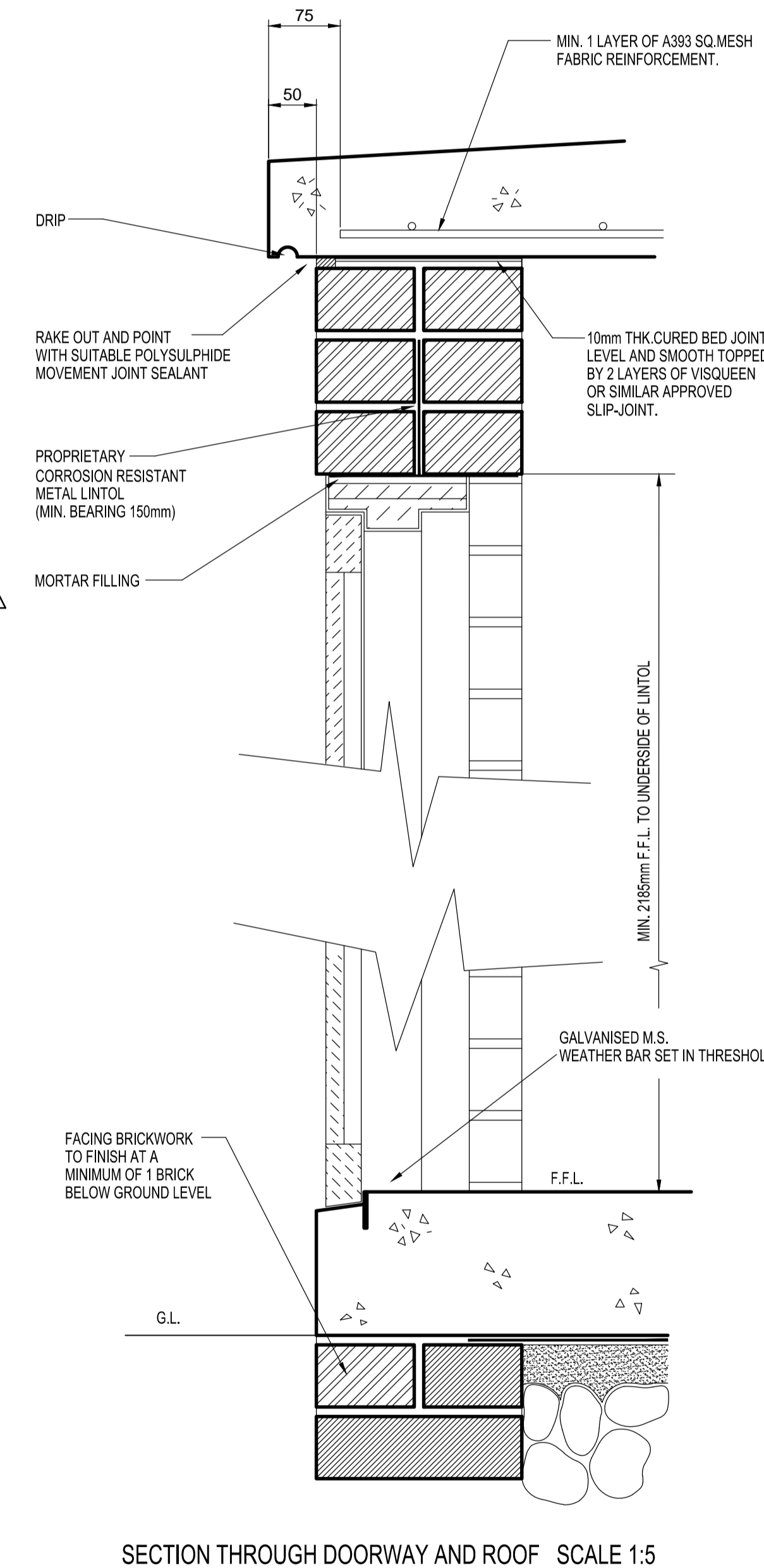
PLAN



SECTION C-C



FOUNDATION PLAN & BRICKWORK BELOW F.F.L.



SECTION THROUGH DOORWAY AND ROOF SCALE 1:5

Rev. 5.0	Date 27/11/17	GENERAL UPDATES TO REFLECT CHANGES TO CIVILS POLICY DOCUMENT
Drawn C.B.	Checked GR	Approved GR



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Telephone 0151 6092491

TYPICAL TRADITIONAL BUILDING DETAILS FOR 11KV BRICKBUILT SUBSTATION (X OR Y TYPE SEPARATE SWITCHGEAR)

Location
TYPICAL

Drawn L.A.	Date 12/4/06	Checked M.T.	Date 12/4/06	Approved A.J.R.	Date 12/4/06
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Status **ISSUED** Drg. No. **SP4000545** Rev. **5.0**

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NOTES

General
This drawing is to be read in conjunction with document SUB-03-017 General Specification for the Civil Engineering and Building Design and Construction of Secondary Substations. It is the constructor's responsibility to confirm, before construction, that the details on this drawing are correct as per SUB-03-017.

This is a generic guidance drawing that is deemed suitable for construction. However the constructor should consider all site specific risk that will affect the design and operation of the substation. Proposed substation details are to be submitted for acceptance before installation.

Details shown on this drawing are typical for this type of substation building but may not be suitable for substations housing alternative equipment. The constructor shall satisfy themselves that the appropriate details shown are correct depending on the type of substation being constructed.

Concrete
General
The concrete shall be in accordance with the specification and attain the relevant cub crushing strength at 28 days.

Foundations (Concrete 40N/mm² 28-Day Cube Strength)
Foundations are to be set on undisturbed inorganic strata that provide the required minimum design safe ground bearing capacity. Minimum bearing capacity to be 75kN/m².

Floor (Concrete 40N/mm² 28-Day Cube Strength)
Floors of substations housing indoor switchgear shall have a visqueen damp proof membrane installed where graded stone infill is used.
A flat, level and smooth floor surface is essential for installation of plant. Tolerances to finished level expressed as a maximum permissible deviation beneath a straight edge with feet placed anywhere on the floor shall not exceed 1mm in 1m or 3mm in 3m. Floors to be cured, prepared & painted with 2 No. Coats of non-slip floor paint on completion.

Brickwork
General
All brickwork below D.P.C. to be H.D. category 1 min. 75N/mm² mean compressive strength and max 7% M.A. and durability designation F2 S2 (Ex Engineering Brickwork Class B) in English bond except for exposed faces.
External facing brickwork to be H.D. category 1 min. 30N/mm² mean compressive strength and max 12% M.A. and durability designation F1 S1 or better.
Internal facing brickwork to fair faced smooth textured solid concrete bricks, sized to match external facing bricks and with a mean compressive strength of not less than 20N/mm².
Class iii mortar.

Walls
External walls to enclosures housing Indoor Equipment shall be cavity construction that provides, as a minimum, standard thermal insulation values in accordance with the table below. The internal leaf shall be solid brickwork construction minimum 215mm overall thickness. Walls shall be fair-faced plumb and smooth to the interior.
Leaves of walls to be tied together by means of type 1 or type 2 stainless steel ties laid in every fourth course at 375mm centres and set back 38mm from outer face, ties are to be staggered.

Doors
Details of proposed doors shall be submitted to SPEN for comment, before work commences.
Proprietary GRP faced aluminium or steel security doors are the preferred option, unless stated otherwise.
An alternative option for hardwood doors (see Drg SP4000543 for details) or GRP doors is also available.

Cable Trench & Slots/Ramp
On completion of cabling, cable trench to be filled with dry sand and skimmed with minimum 50mm depth of sand/cement screed over a visqueen membrane (top to be level with FFL).

Roof
Roofs shall provide a minimum standard thermal insulation values as detailed in the table below.

Roof shall be proprietary precast pre-stressed beam and in situ concrete screed topping systems with a fair-faced soffit finish, sealed joints and with reinforcement to screed where applicable with water proofing as shown in the Typical Detail above.

Ventilation
Nominal trickle ventilation is to be provided to reduce the risk of condensation.

Insulation
Substations housing indoor switchgear require insulation. U values for wall and roof shall meet those detailed in the table below:

REGION	ROOF U (W/m ² k)	WALLS U (W/m ² k)
SCOTLAND	0.2	0.27
ENGLAND & WALES	0.25	0.35

Related Typical Deemed to Satisfy Drawings
Hardwood Doors SP4000543
Meter Cupboards SP4078901

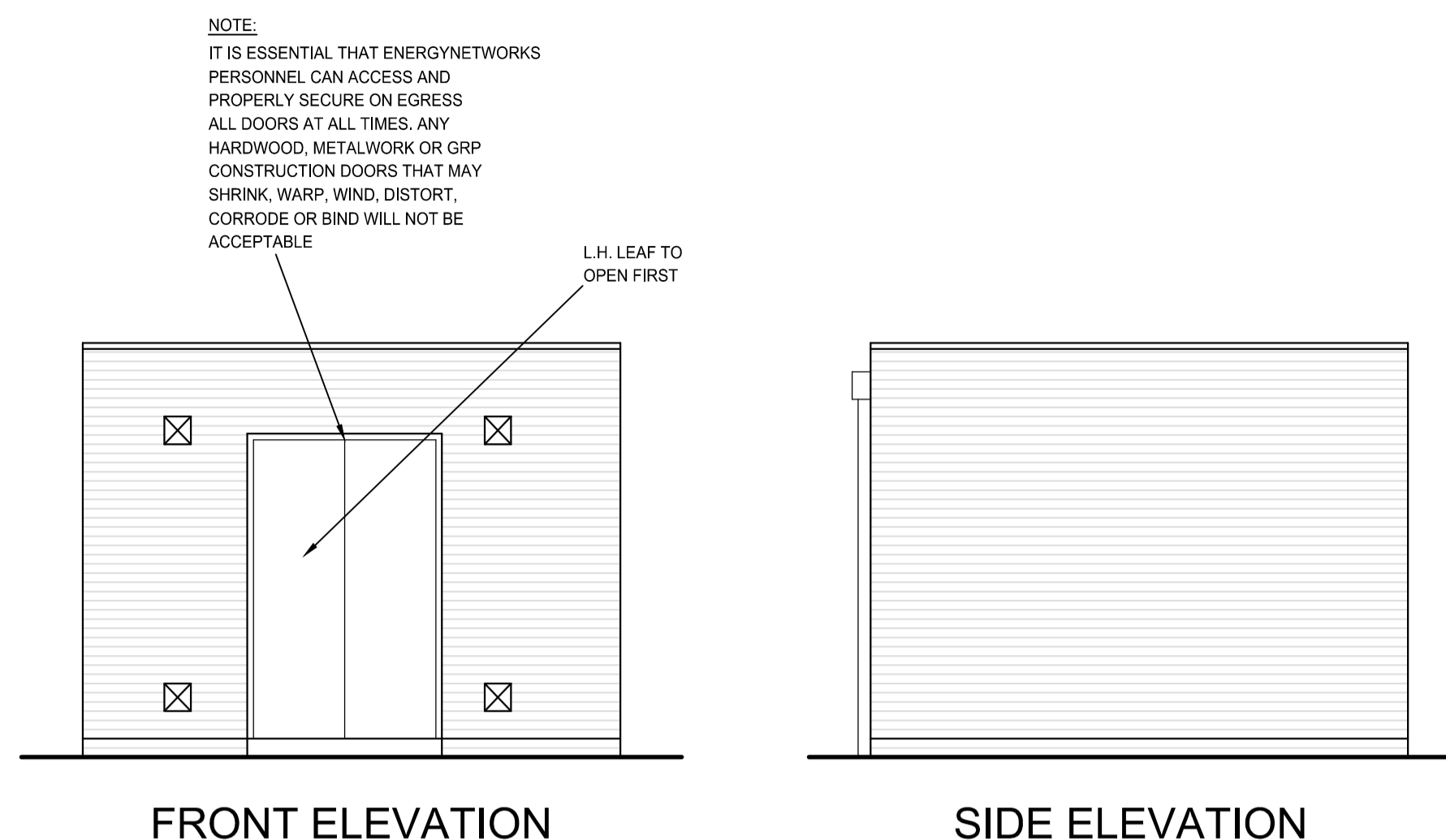
Rev. 6.0	Date 27/11/17	GENERAL UPDATES TO REFLECT CHANGES TO CIVILS POLICY DOCUMENT
Drawn C.B.	Checked G.R.	Approved G.R.



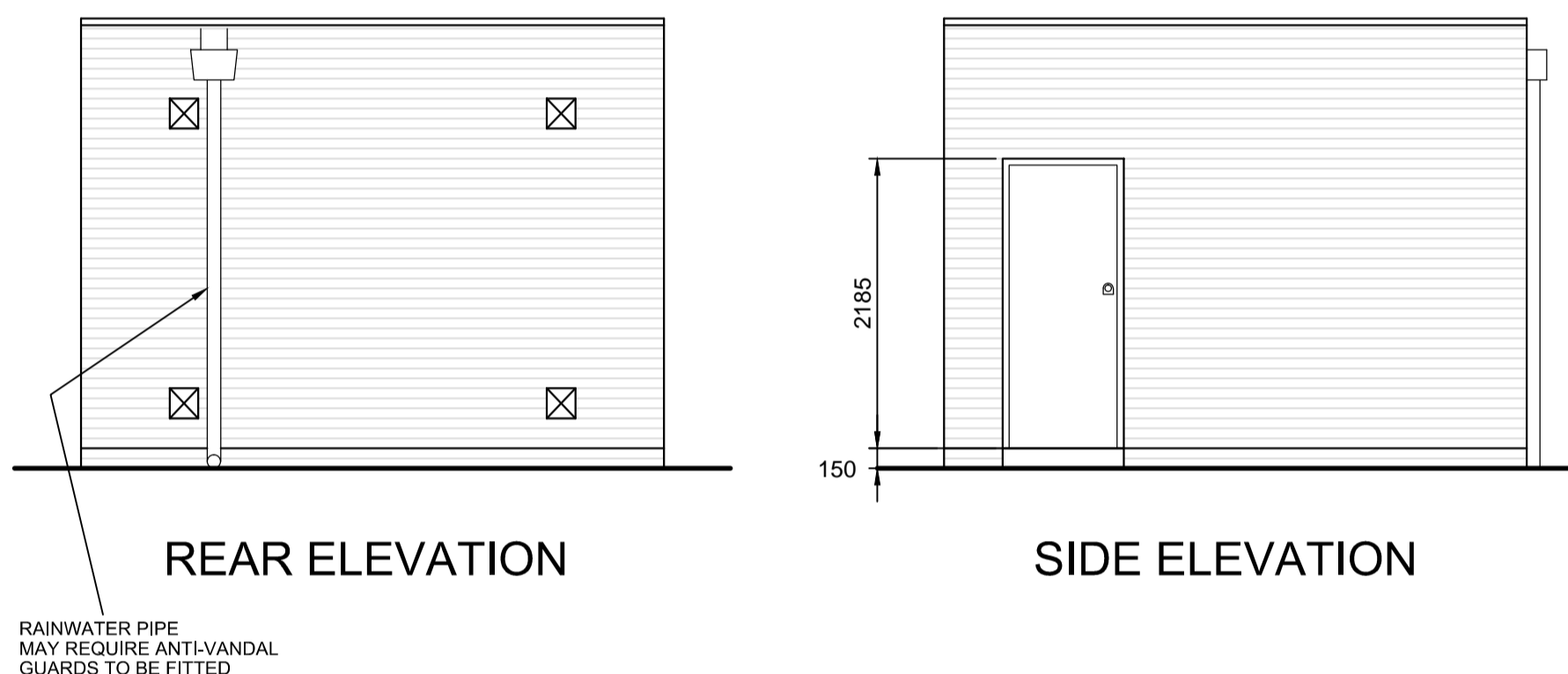
SP PowerSystems Ltd
System Design, Drawing Office
3 Prenton Way, Prenton, CH43 3ET
Telephone 0151 6092491

Title
TYPICAL TRADITIONAL BUILDING DETAILS FOR 11KV BRICKBUILT SUBSTATION (3 PANEL BOARD WITH METERING)

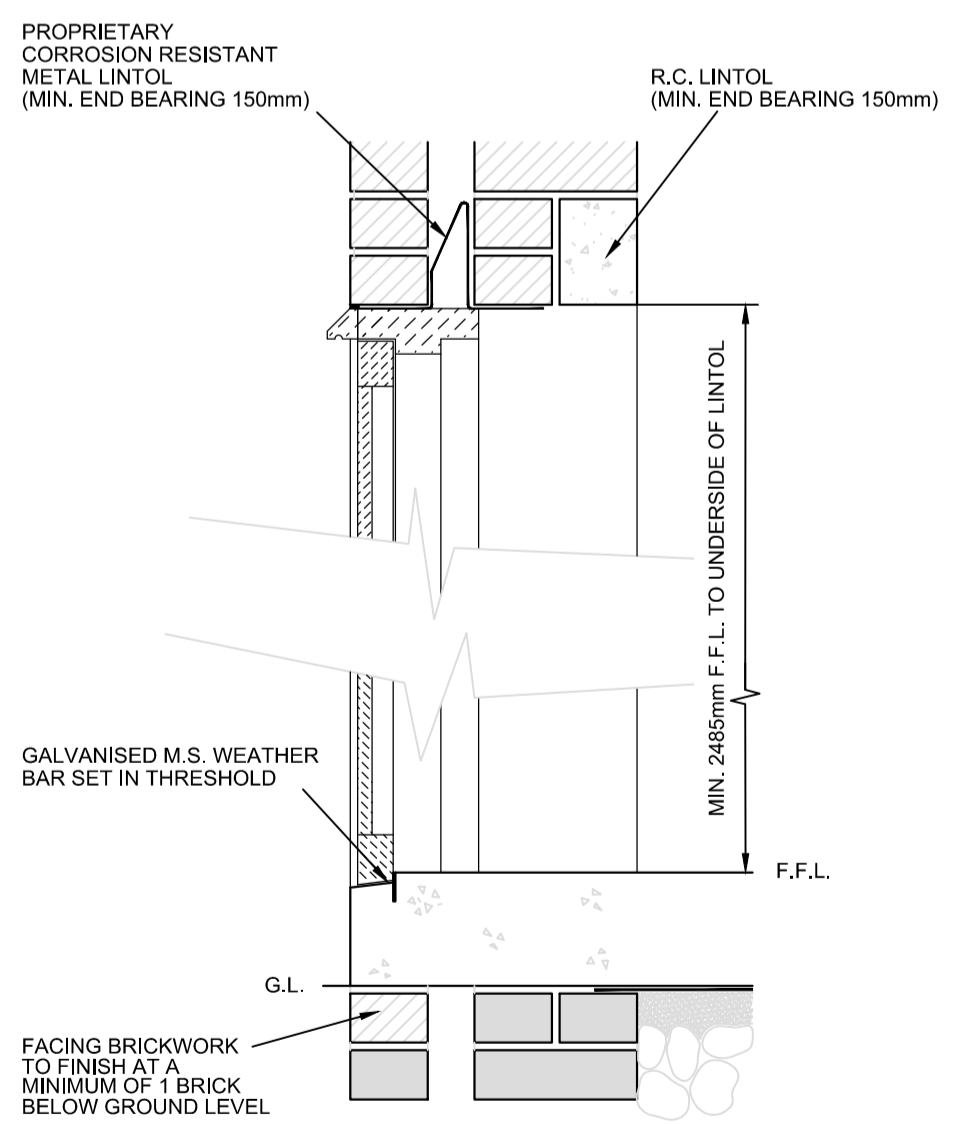
Location TYPICAL		Date DEC.06		Date DEC.06	
Drawn M.T.		Checked C.W.		Approved A.J.R.	
Status ISSUED		Drg. No. SP4008870		Rev. 6.0	
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				Size A1	



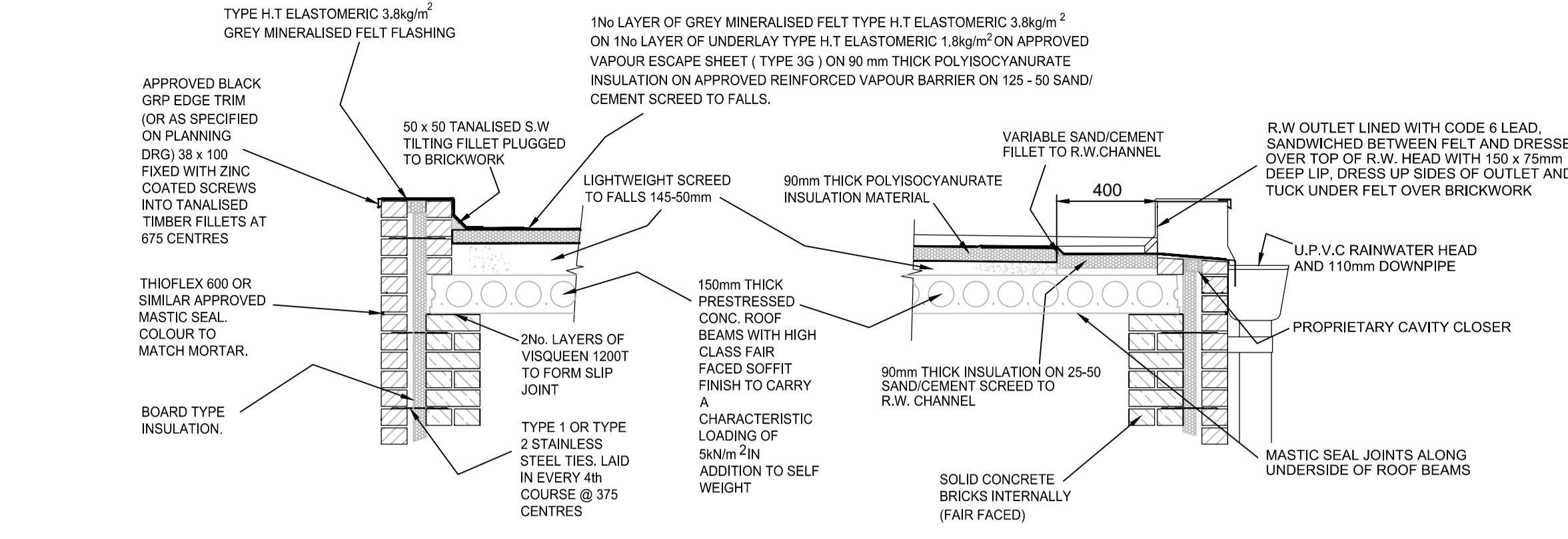
FRONT ELEVATION **SIDE ELEVATION**



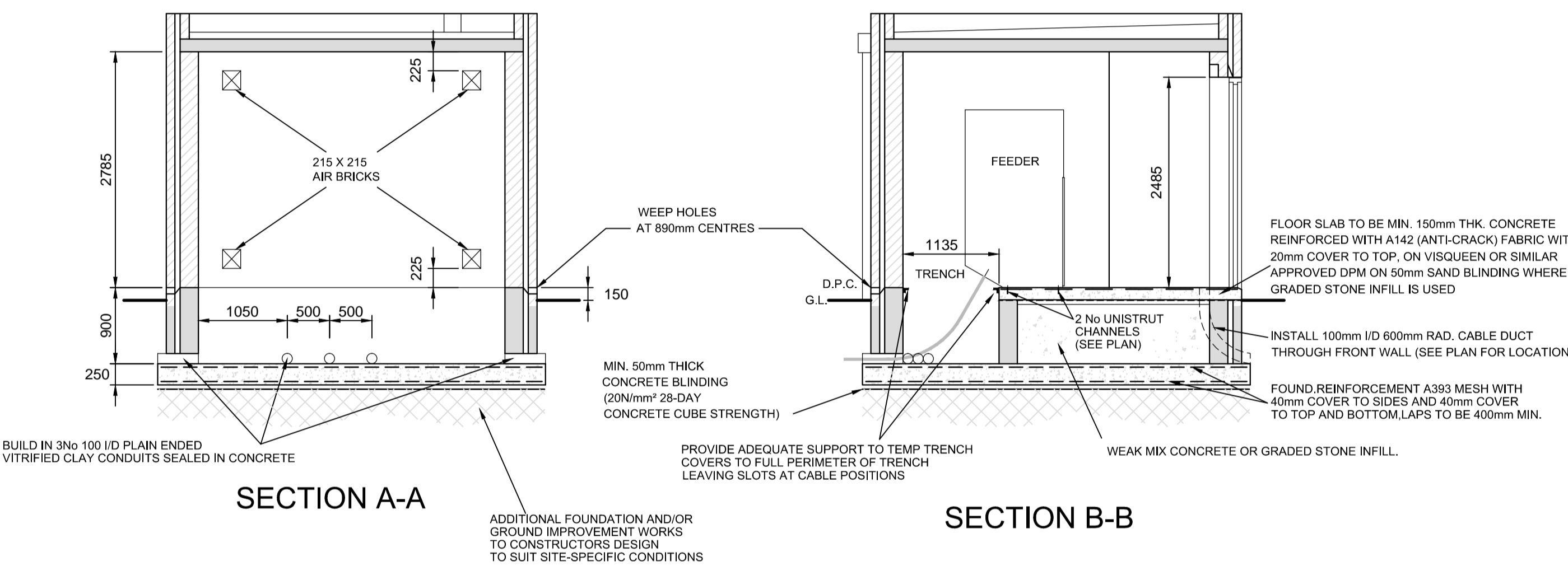
REAR ELEVATION **SIDE ELEVATION**



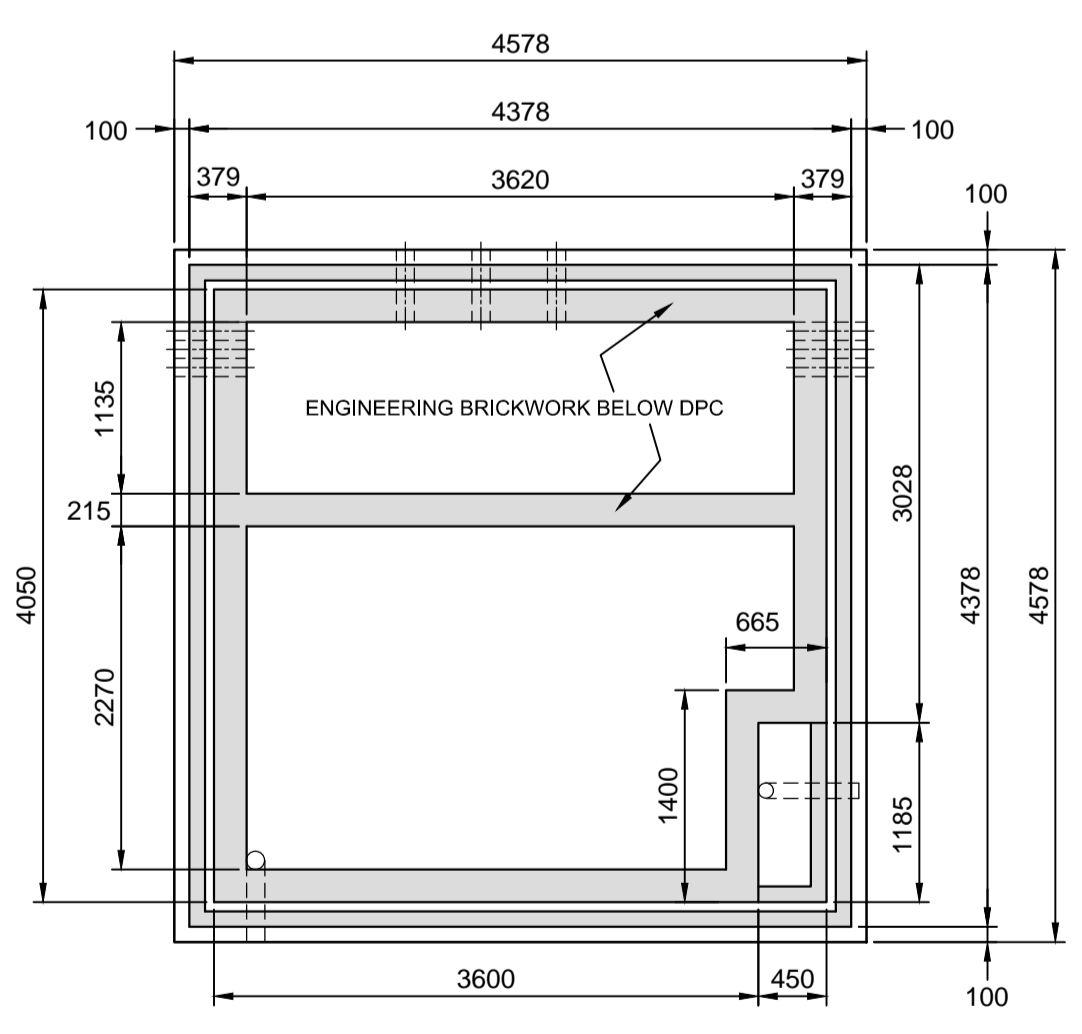
DOUBLE DOORWAY SECTION
Scale 1:10



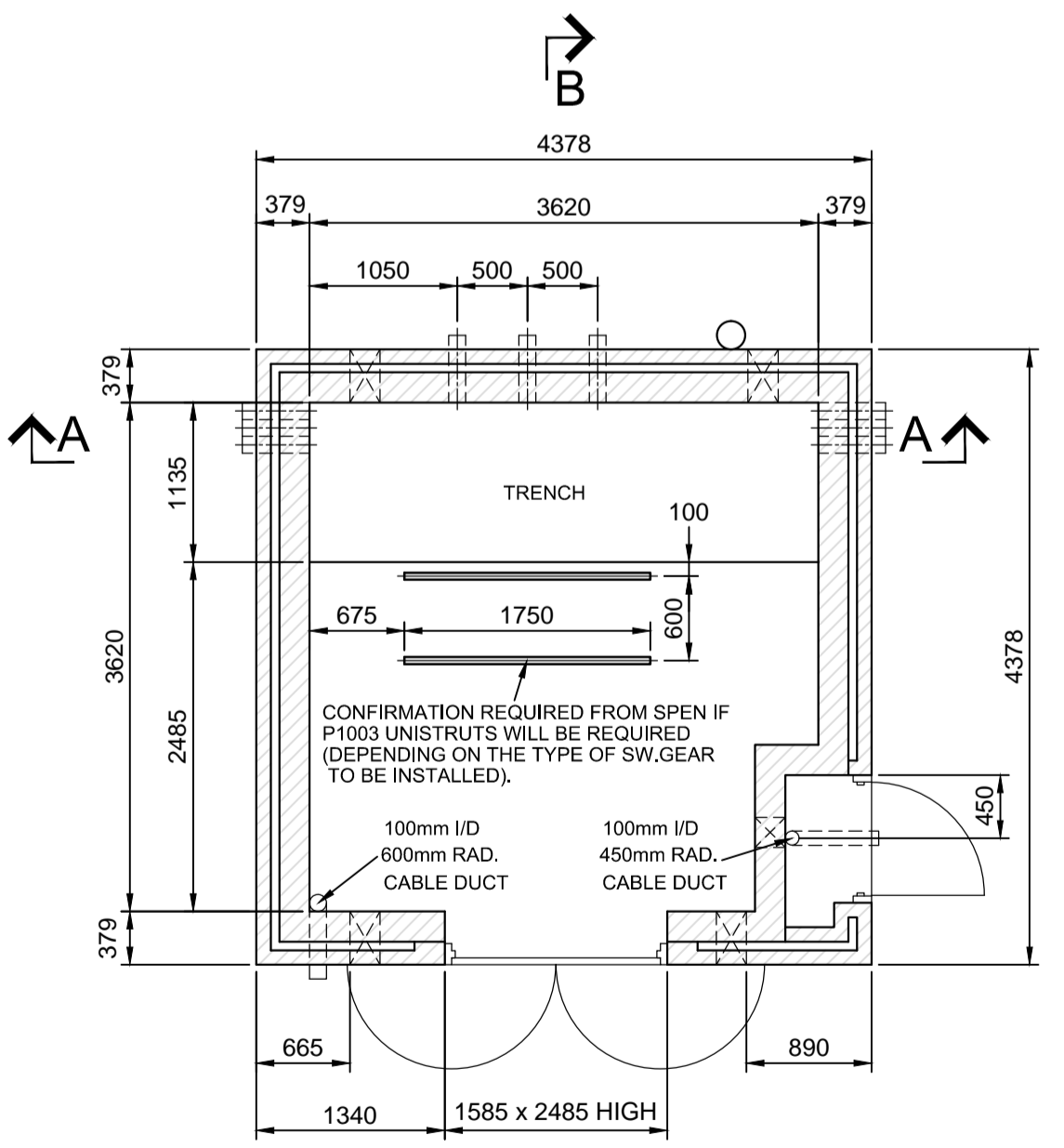
TYPICAL DETAIL AT HIGH POINT & END BEARING **TYPICAL DETAIL AT ROOF OUTLET & SIDE BEARING**
Scale 1:25



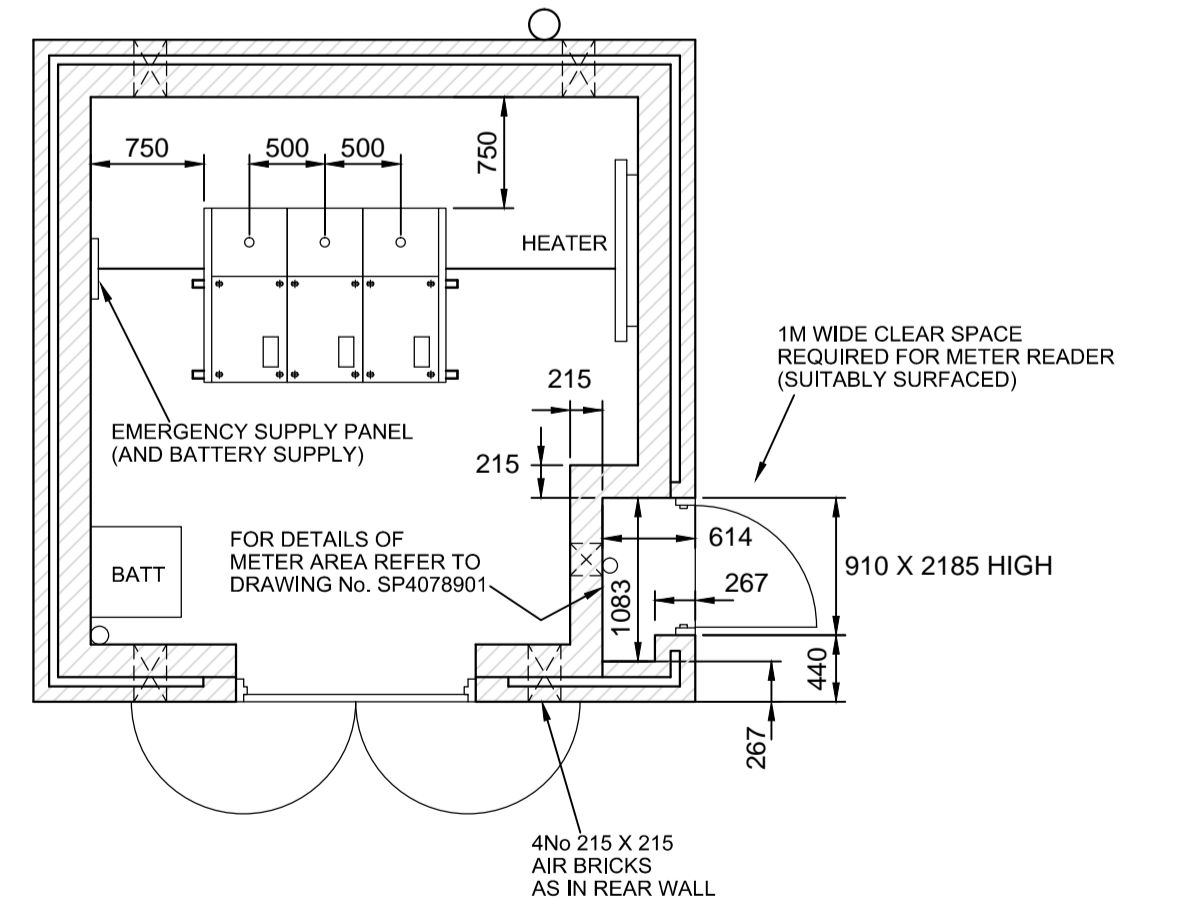
SECTION A-A **SECTION B-B**



FOUNDATION PLAN & BRICKWORK BELOW F.F.L.



PLAN



PLAN OF PLANT

NOTES

General
This drawing is to be read in conjunction with document SUB-03-017 General Specification for the Civil Engineering and Building Design and Construction of Secondary Substations. It is the constructor's responsibility to confirm, before construction, that the details on this drawing are correct as per SUB-03-017.

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Details shown on this drawing are typical for this type of substation building but may not be suitable for substations housing alternative equipment. The constructor shall satisfy themselves that the appropriate details shown are correct depending on the type of substation being constructed.

Concrete
General
The concrete shall be in accordance with the specification and attain the relevant cub crushing strength at 28 days.

Foundations (Concrete 40N/mm² 28-Day Cube Strength)
Foundations are to be set on undisturbed inorganic strata that provide the required minimum design safe ground bearing capacity. Minimum bearing capacity to be 75kN/m².

Floor (Concrete 40N/mm² 28-Day Cube Strength)
Floors of substations housing indoor switchgear shall have a visqueen damp proof membrane installed where graded stone infill is used. A flat, level and smooth floor surface is essential for installation of plant. Tolerances to finished level expressed as a maximum permissible deviation beneath a straight edge with feet placed anywhere on the floor shall not exceed 1mm in 1m or 3mm in 3m. Floors to be cured, prepared & painted with 2 No. Coats of non-slip floor paint on completion.

Brickwork
General
All brickwork below D.P.C. to be H.D. category 1 min. 75N/mm² mean compressive strength and max 7% M.A. and durability designation F2 S2 (Ex Engineering Brickwork Class B) in English bond except for exposed faces.
External facing brickwork to be H.D. category 1 min. 30N/mm² mean compressive strength and max 12% M.A. and durability designation F1 S1 or better.
Internal facing brickwork to fair faced smooth textured solid concrete bricks, sized to match external facing bricks and with a mean compressive strength of not less than 20N/mm².
Class iii mortar.

Walls
External walls to enclosures housing Indoor Equipment shall be cavity construction that provides, as a minimum, standard thermal insulation values in accordance with the table below. The internal leaf shall be solid brickwork construction minimum 215mm overall thickness. Walls shall be fair-faced plumb and smooth to the interior.
Leaves of walls to be tied together by means of type 1 or type 2 stainless steel ties laid in every fourth course at 375mm centres and set back 38mm from outer face, ties are to be staggered.

Doors
Details of proposed doors shall be submitted to SPEN for comment, before work commences.
Proprietary GRP faced aluminium or steel security doors are the preferred option, unless stated otherwise.
An alternative option for hardwood doors (see Drg SP4000543 for details) or GRP doors is also available.

Cable Trench & Slots/Ramp
On completion of cabling, cable trench to be filled with dry sand and skimmed with minimum 50mm depth of sand/cement screed over a visqueen membrane (top to be level with FFL).

Roof
Roofs shall provide a minimum standard thermal insulation values as detailed in the table below.

Roof shall be proprietary precast pre-stressed beam and in situ concrete screed topping systems with a fair-faced soffit finish, sealed joints and with reinforcement to screed where applicable with water proofing shall be that as shown in the Typical Detail above.

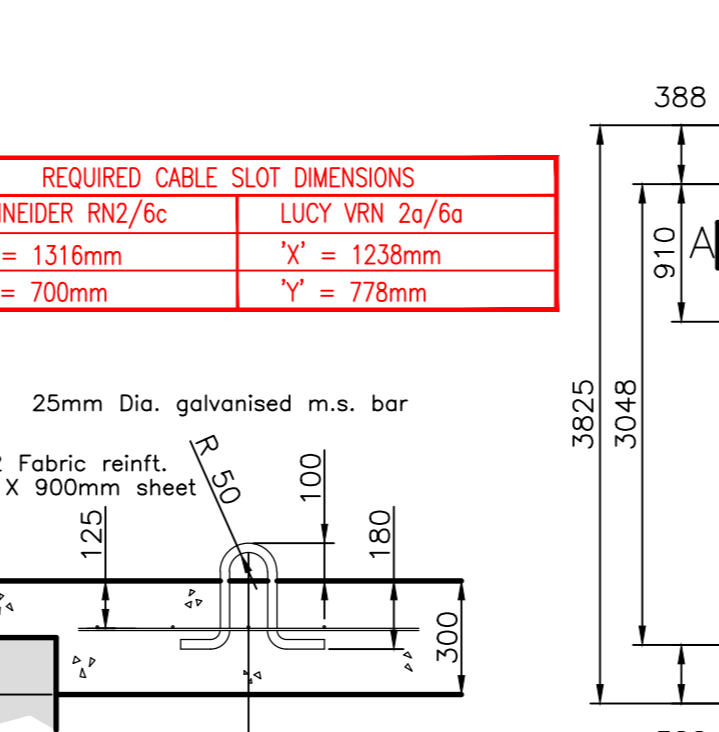
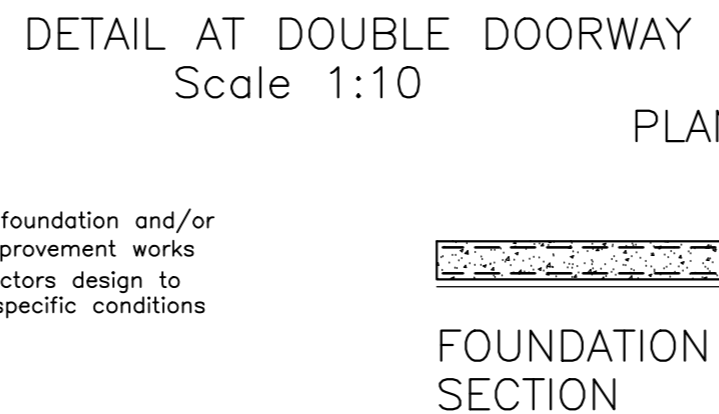
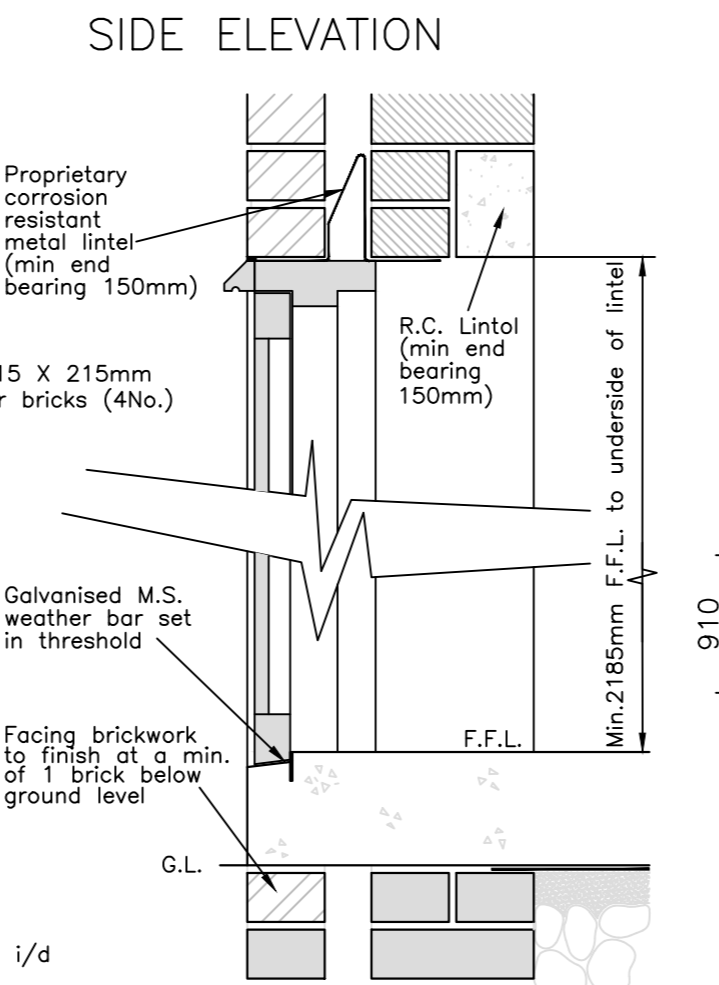
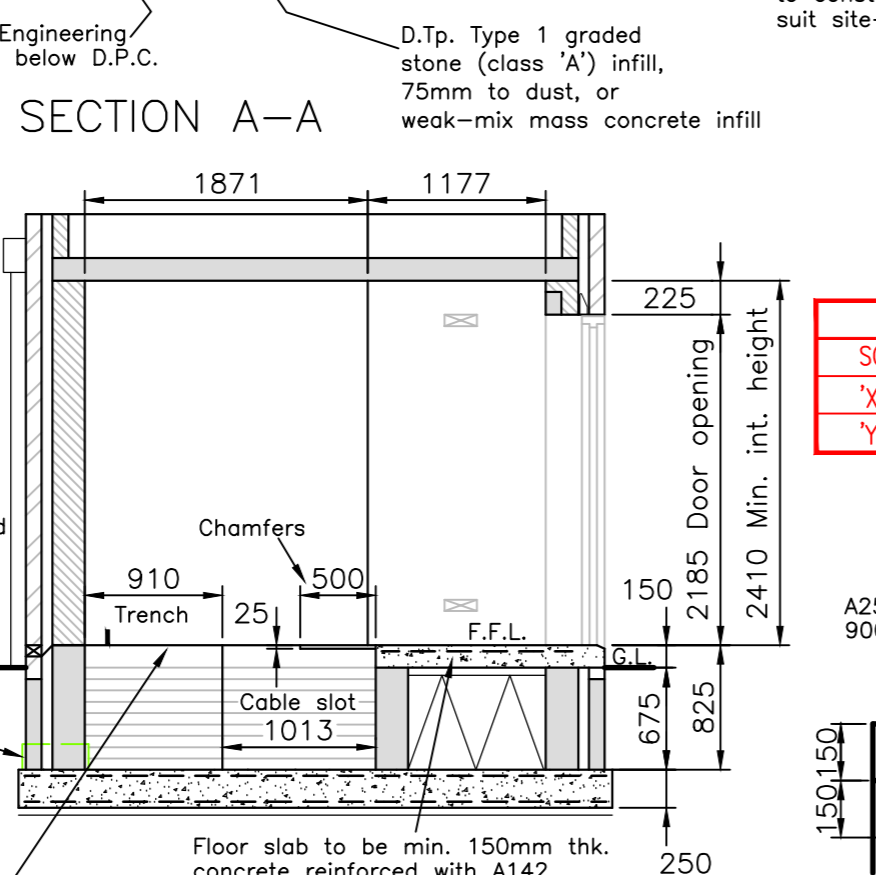
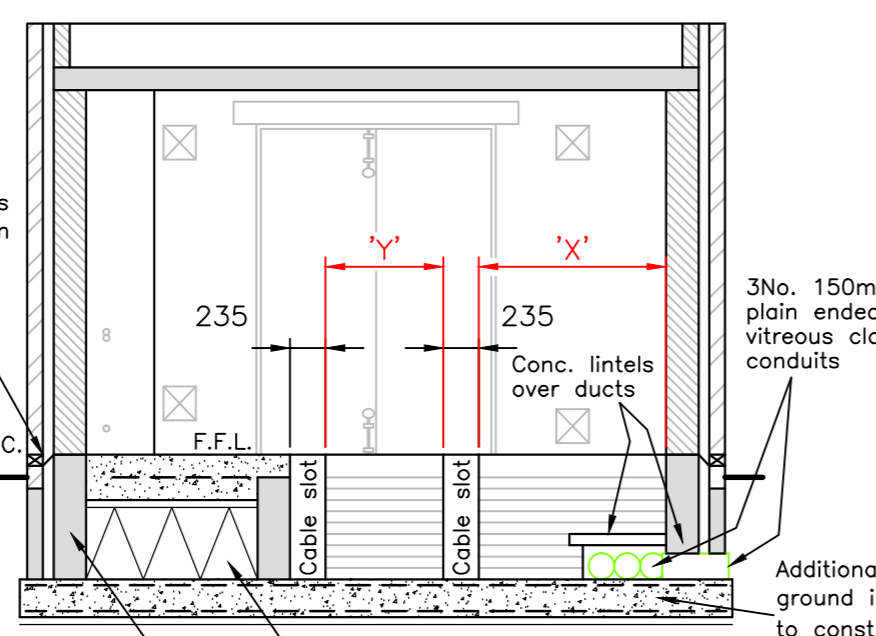
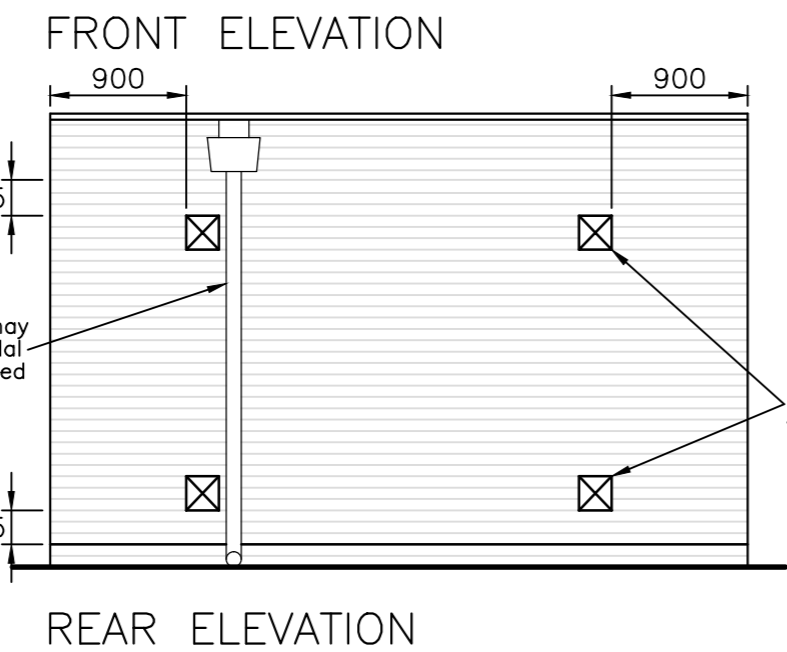
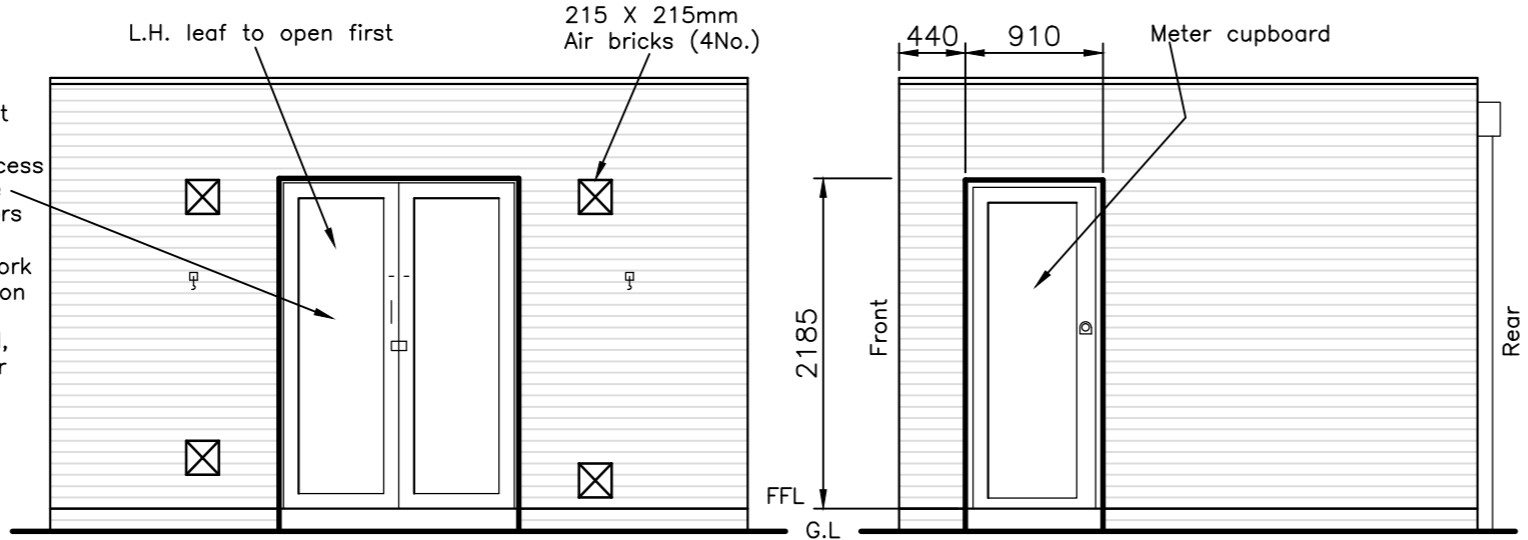
Ventilation
Nominal trickle ventilation is to be provided to reduce the risk of condensation.

Insulation
Substations housing indoor switchgear require insulation. U values for wall and roof shall meet those detailed in the table below:

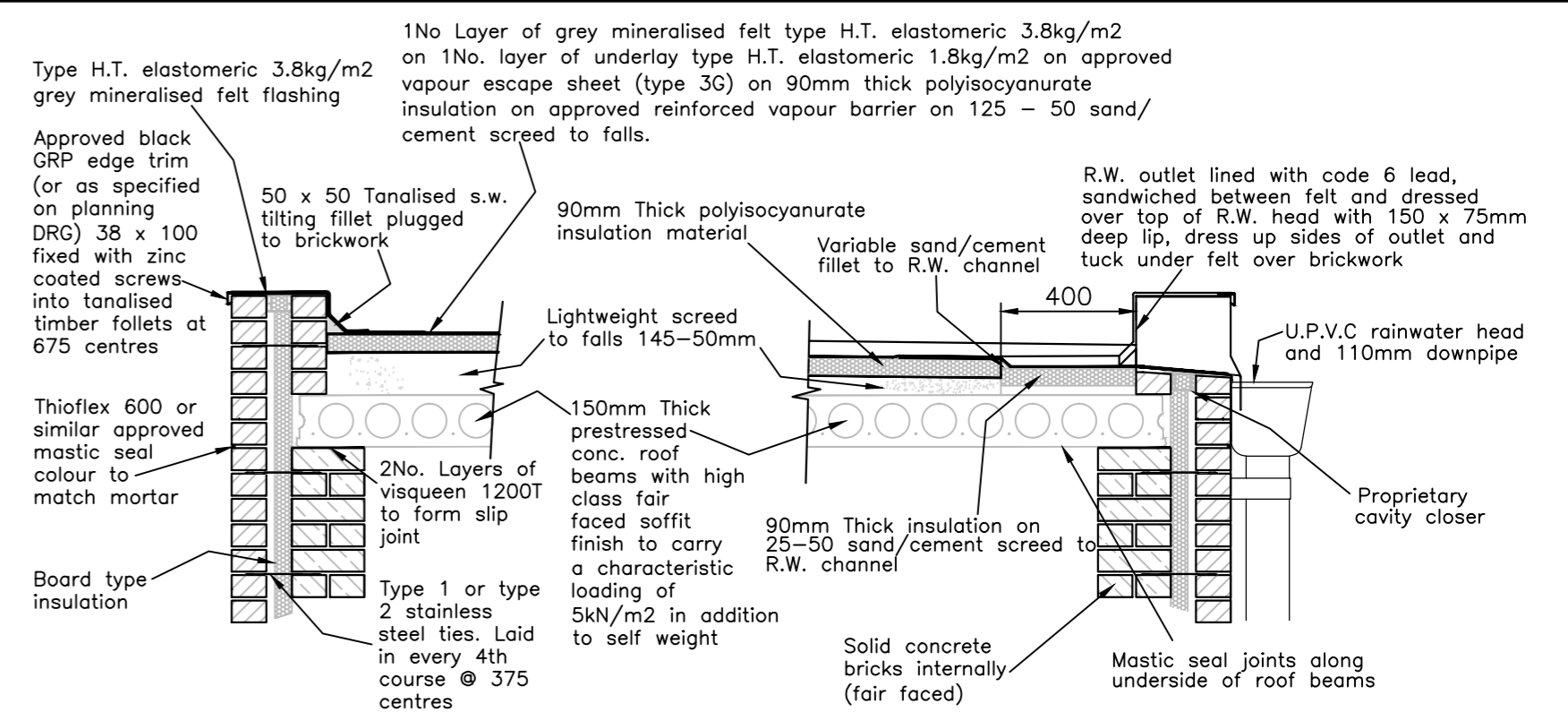
REGION	ROOF U (W/m ² k)	WALLS U (W/m ² k)
SCOTLAND	0.2	0.27
ENGLAND & WALES	0.25	0.35

Related Typical Deemed to Satisfy Drawings
Hardwood Doors SP4000543
Meter Cupboards SP4078901

NOTE
It is essential that EnergyNetworks personnel can access & properly secure on egress all doors at all times. Any hardwood, metalwork or GRP construction doors that may shrink, warp, wind, distort, corrode or will not be acceptable

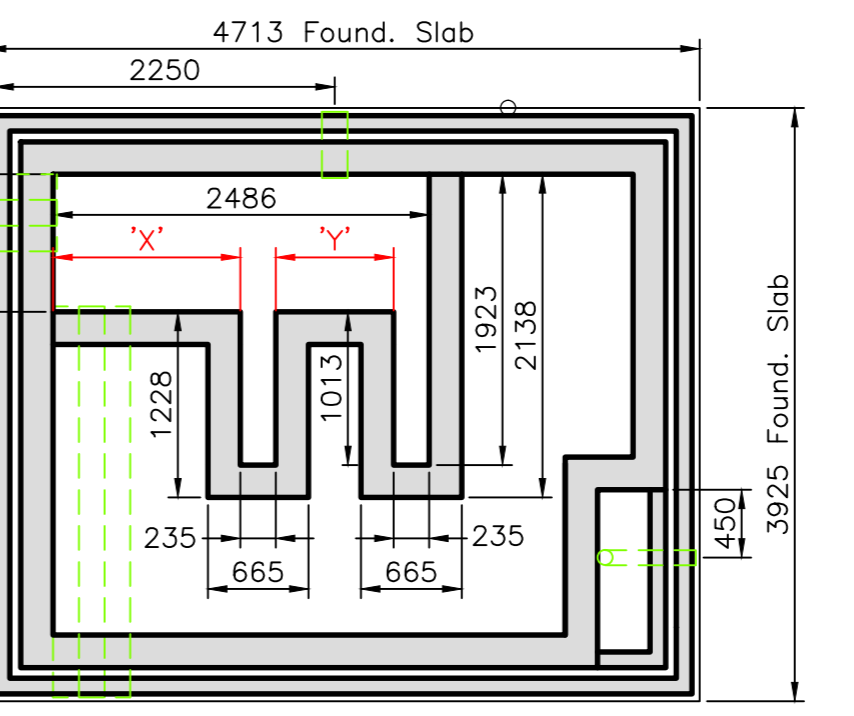


DETAIL OF HAULAGE EYE
Scale 1:20

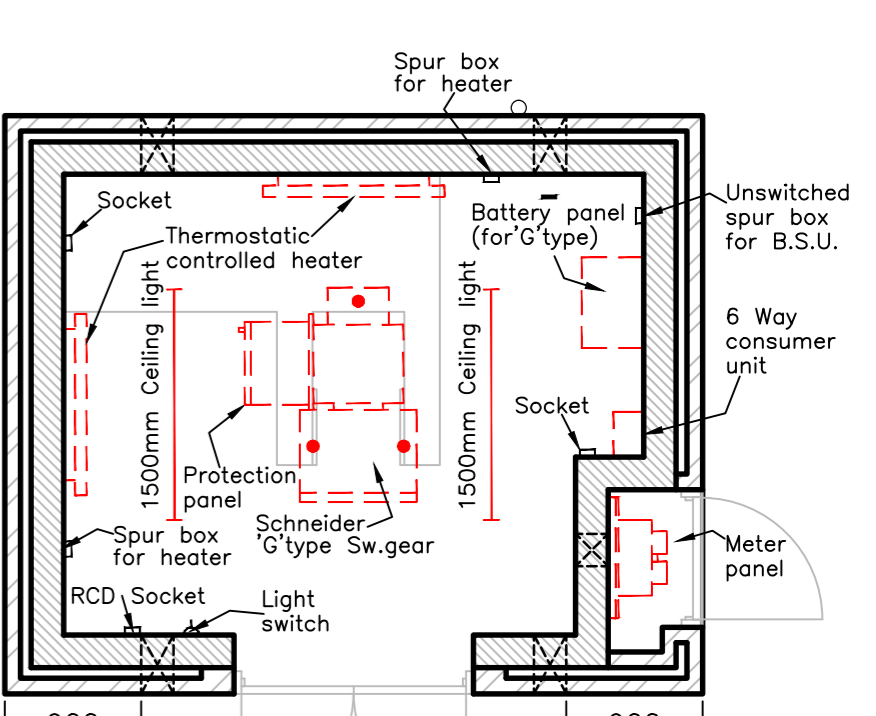


TYPICAL DETAIL AT HIGH POINT & END BEARING
Scale 1:25

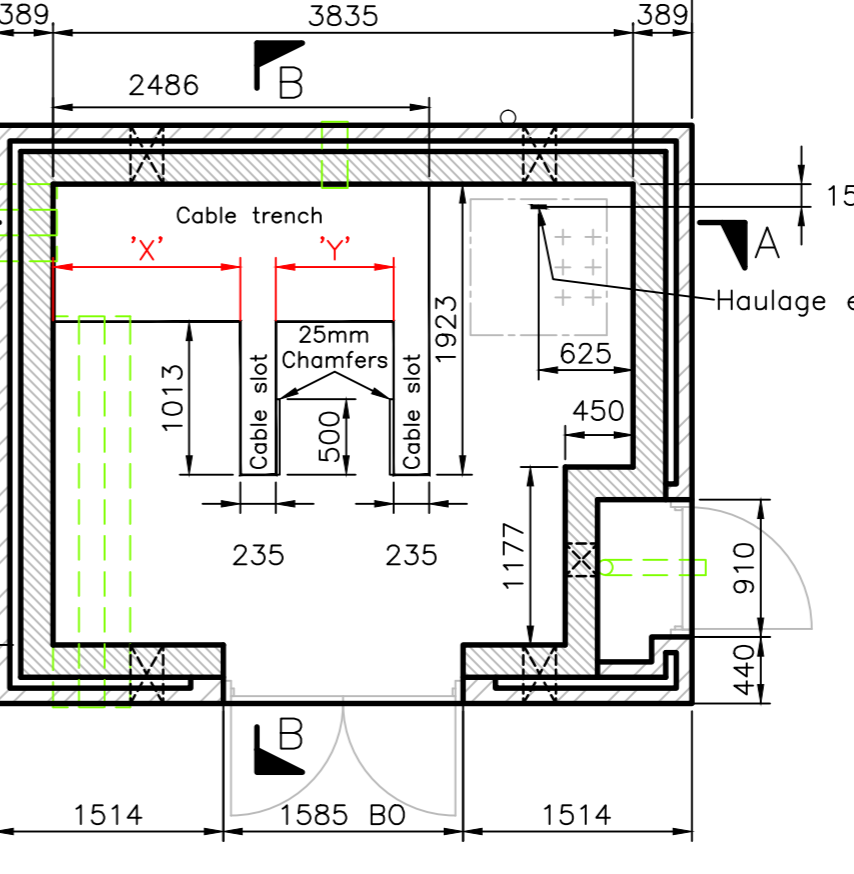
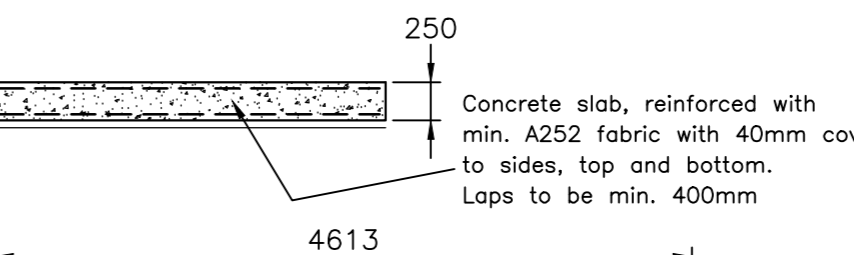
TYPICAL DETAIL AT ROOF OUTLET & SIDE BEARING
Scale 1:25



PLAN OF BRICKWORK BELOW FLOOR SLAB



PLANT LAYOUT



PLAN

REQUIRED CABLE SLOT DIMENSIONS	
SCHNEIDER RN2/6c	LUCY VRN 2a/6a
'X' = 1316mm	'X' = 1238mm
'Y' = 700mm	'Y' = 778mm

Rev. 10.0	Date 27/11/17	GENERAL UPDATES TO REFLECT CHANGES TO CIVILS POLICY DOCUMENT
Drawn C.B.	Checked G.R.	Approved G.R.



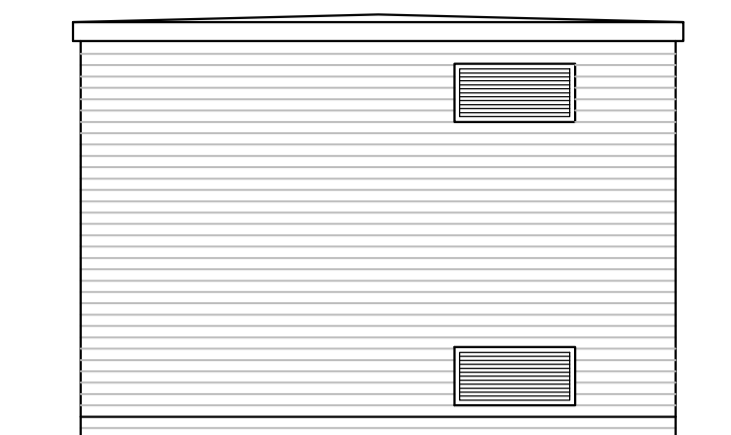
SP PowerSystems Ltd
System Design, Drawing Office, Gateway House,
Old Hall Road, Bromborough, CH62 3NX.
Telephone 0141 614 7143.

Title
TYPICAL TRADITIONAL BUILDING DETAILS FOR 11kV BRICKBUILT SUBSTATION ('D' OR 'G' TYPE RMU WITH METERING)

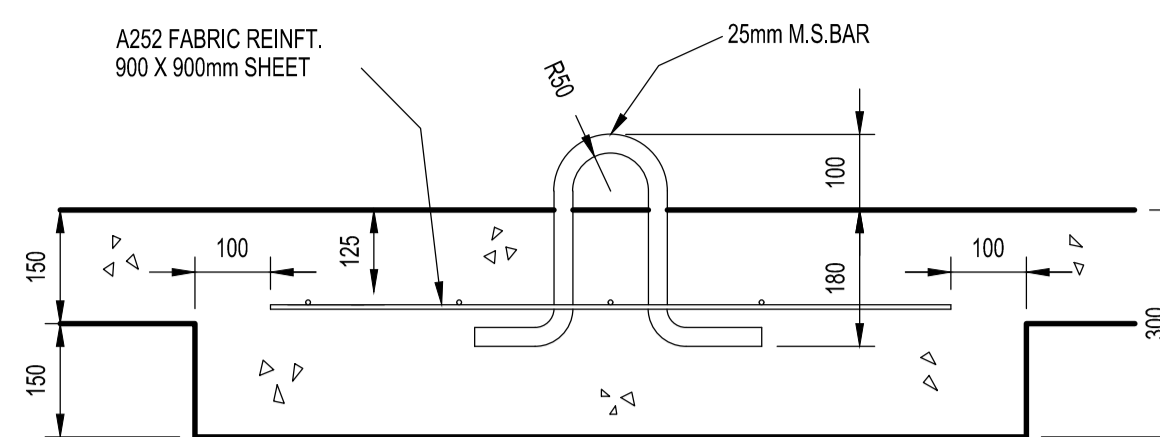
Location 11kV SUBSTATIONS					
Drawn MT	Date OCT 08	Checked C.O.B	Date OCT 08	Approved C.W	Date OCT 08
Status	ISSUED		Drg. No.	Rev.	
			SP4049060	10.0	
© Copyright property of SP PowerSystems Ltd.					Scale 1:50
					Size A2



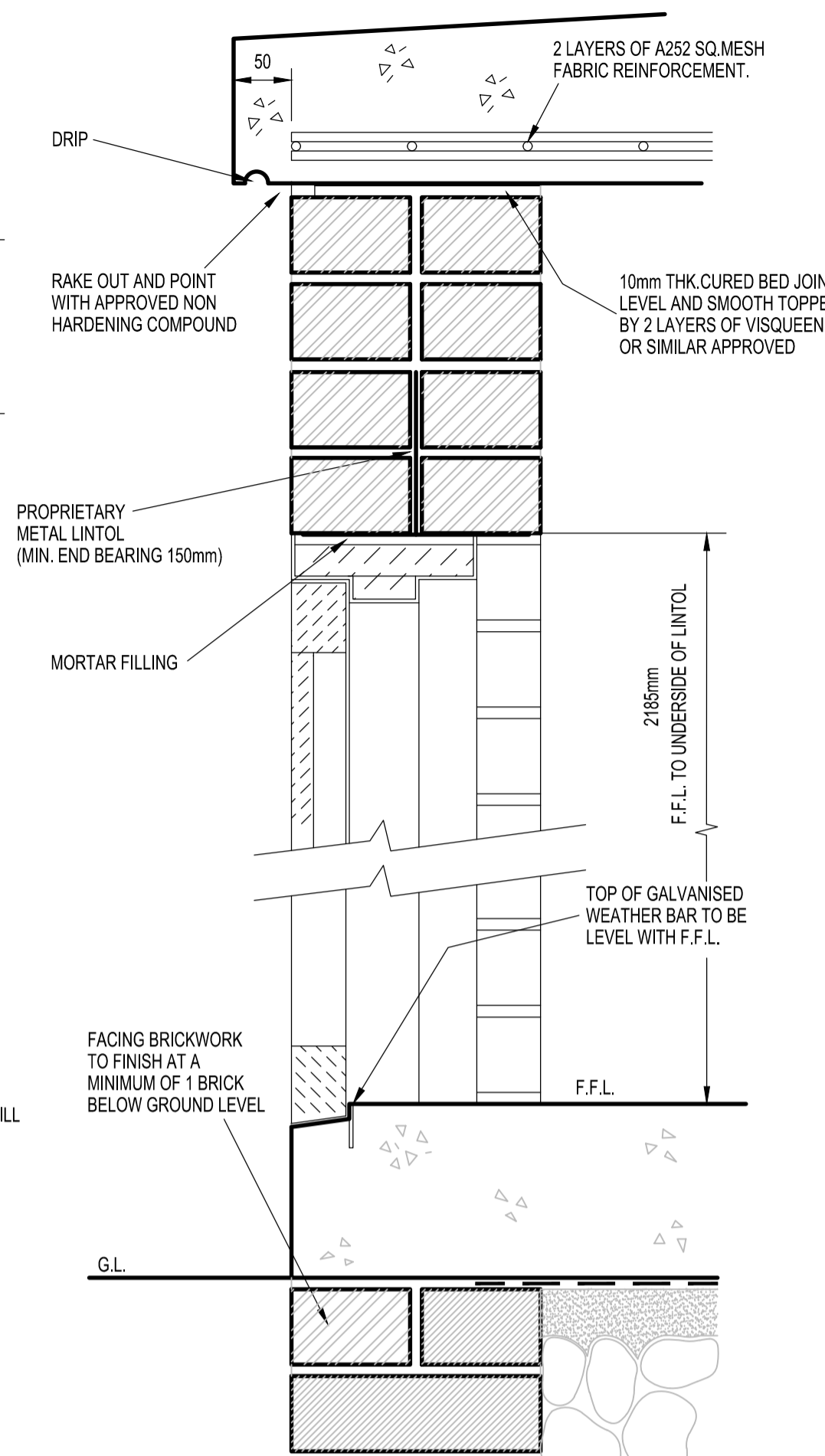
FRONT ELEVATION



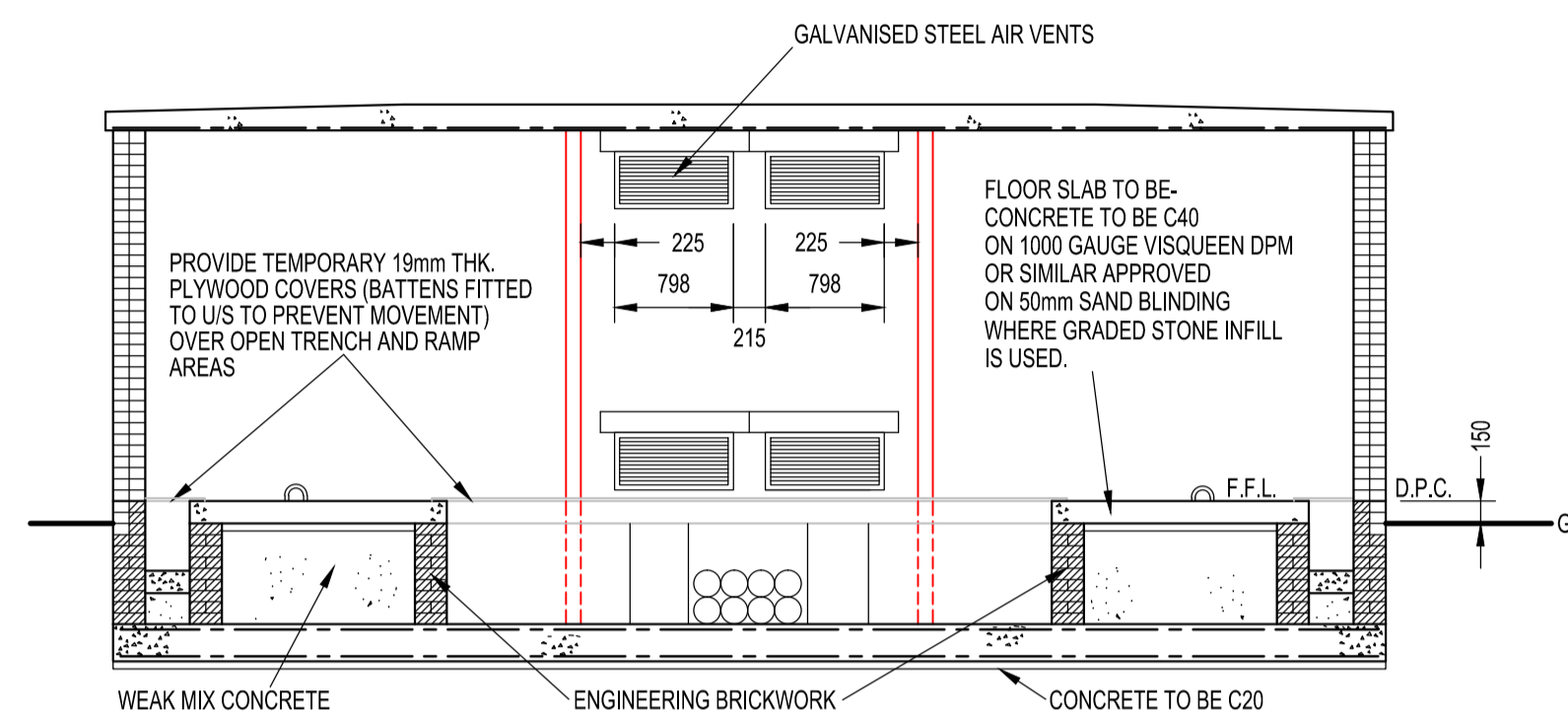
SIDE ELEVATION



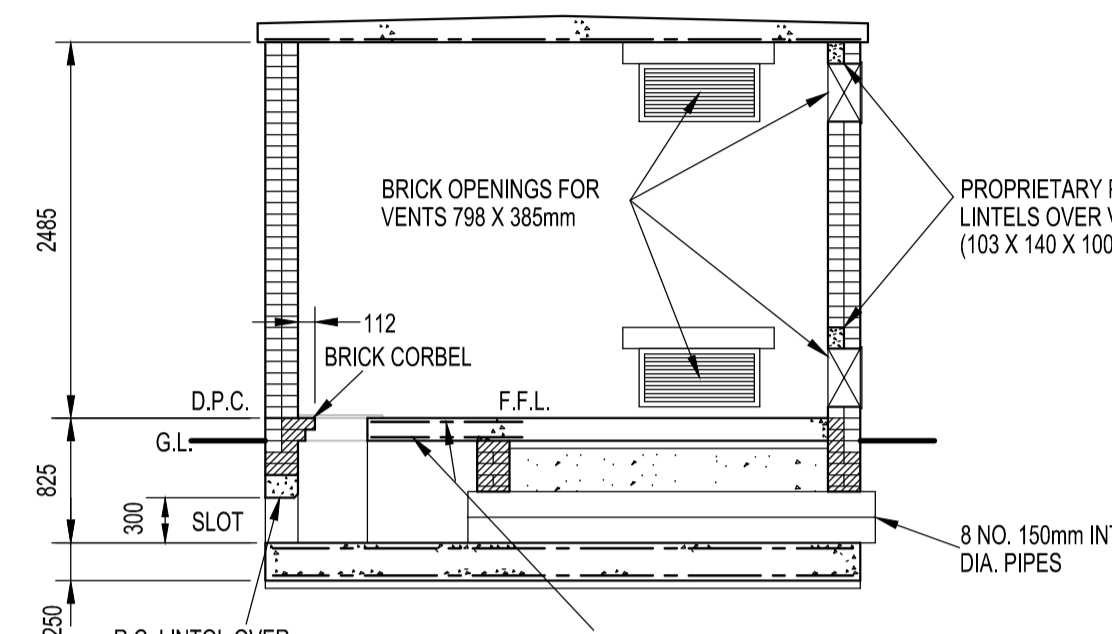
DETAIL OF HAULAGE EYES (2No REQD.) SCALE 1:10



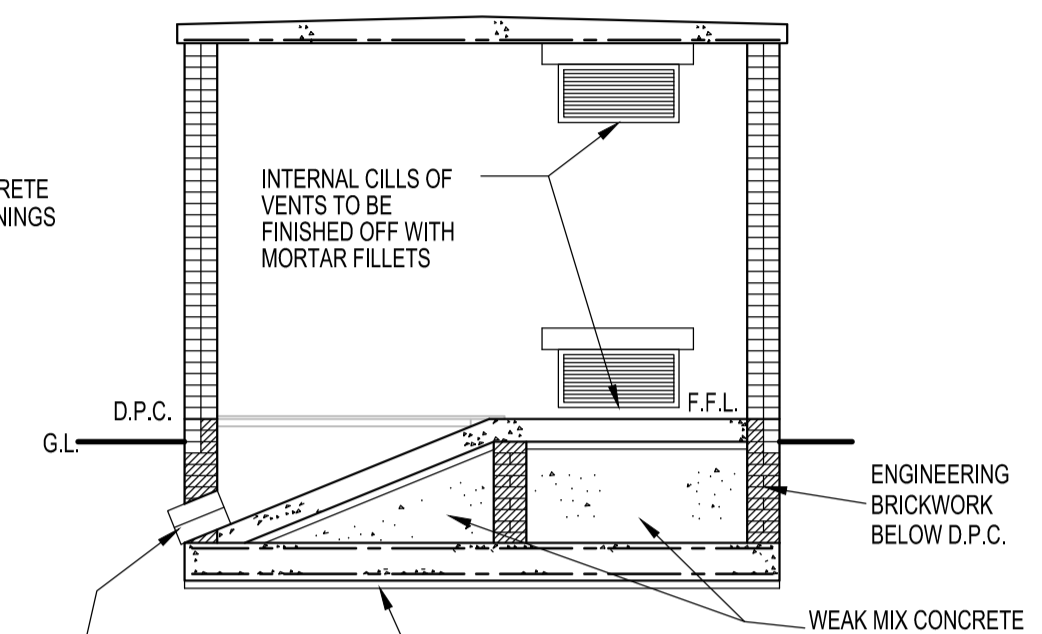
SECTION THROUGH DOORWAY AND ROOF SCALE 1:5



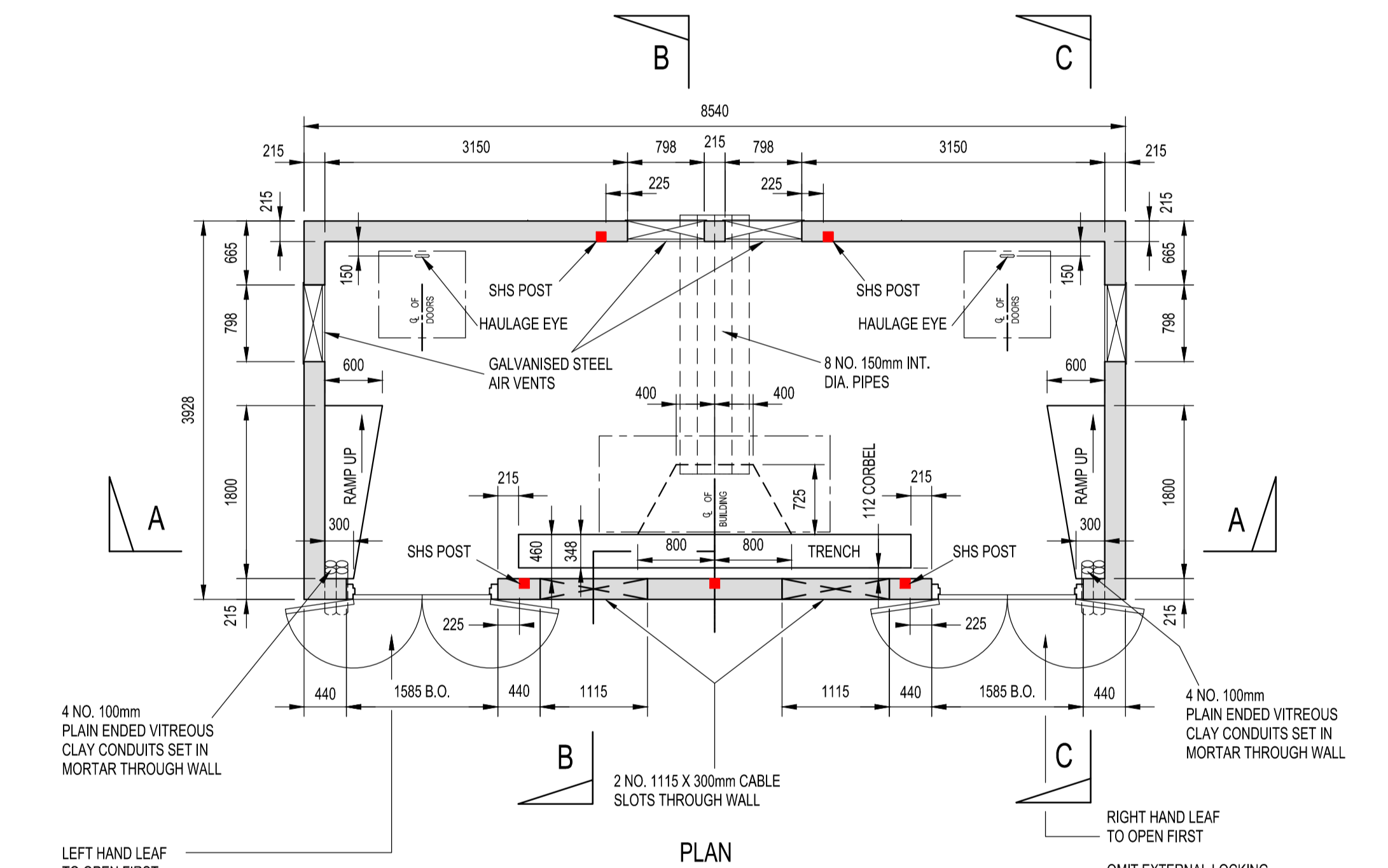
SECTION A-A



SECTION B-B



SECTION C-C



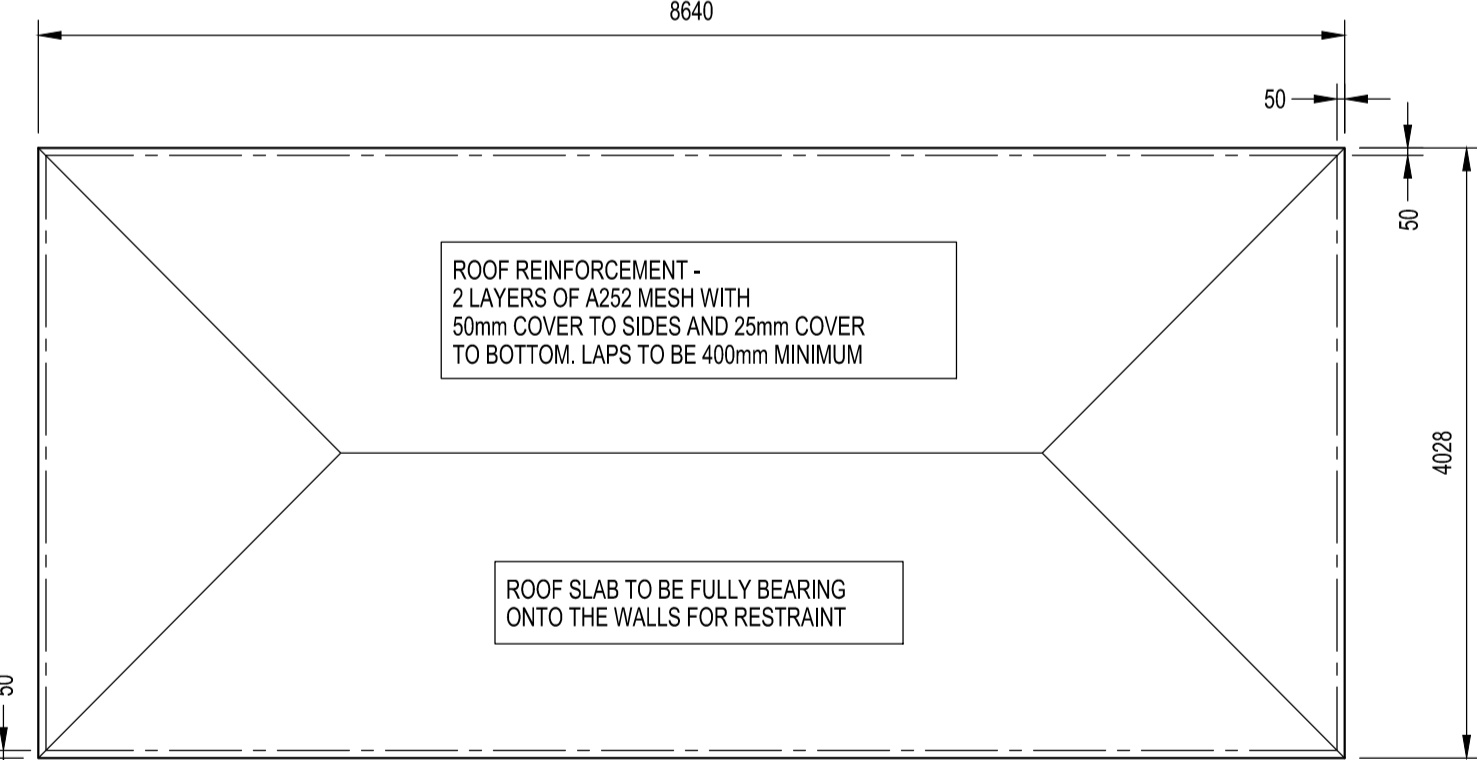
PLAN

MASONRY NOTES (LATERAL RESTRAINT)

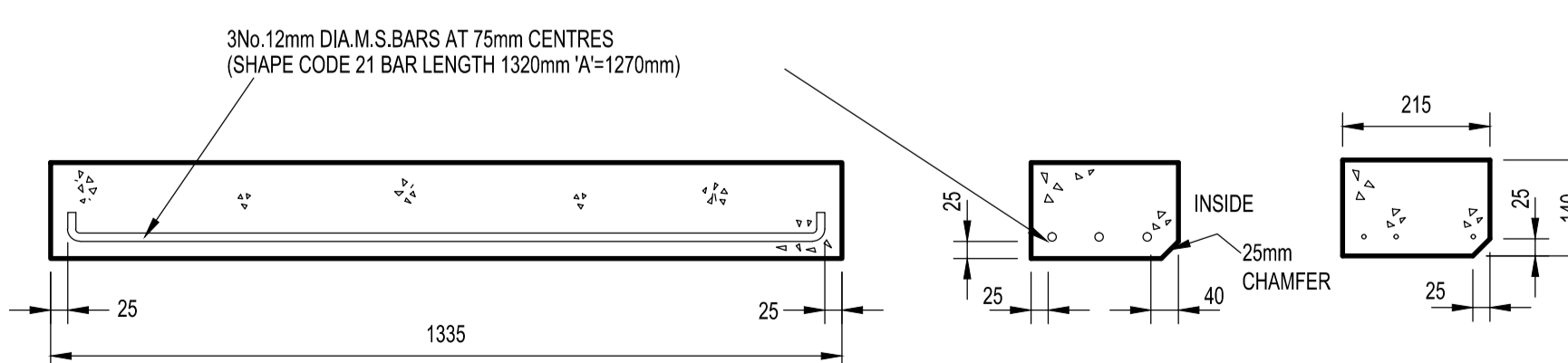
1. 'SPECIAL' CONSTRUCTION MONITORING REQUIRED IN ACCORDANCE WITH BS5628
2. WINDPOST TO U/S OF CONCRETE ROOF TO BE AFTER CURING (E.G SLOTTED CONNECTING PLATE), IN ORDER TO ENSURE FULL ROOF LOAD TRANSFER TO MASONRY.
3. WHERE GALVANISED ANGLE SUPPORT IS USED IN LIEU OF BRICK CORBEL THIS SHALL BE 50x75mm (VERTICAL), FIXED WITH PROPRIETARY 12mm DIA. CORROSION RESISTANT EXPANDING BOLTS AT MAXIMUM 450mm C/S & FLUSH WITH FFL.



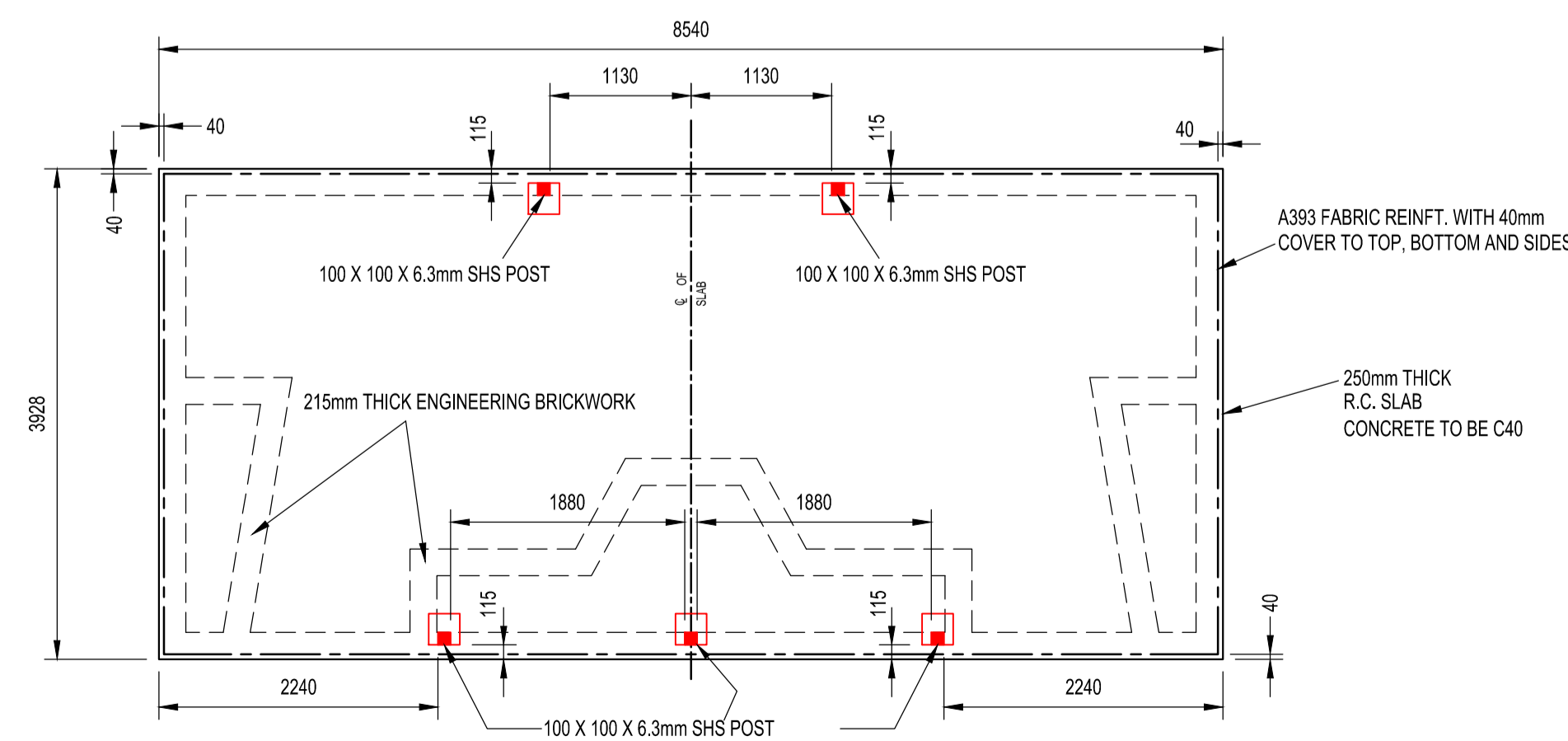
ROOF SECTION



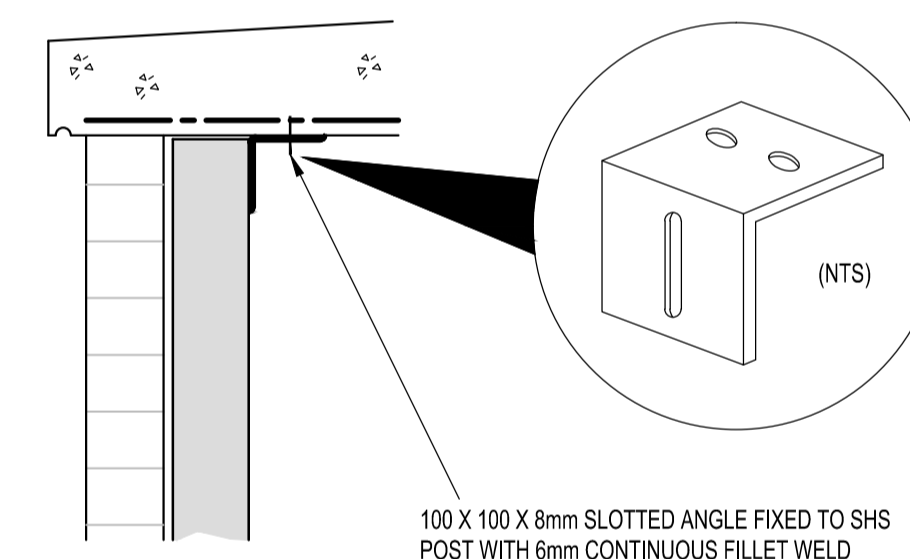
ROOF PLAN



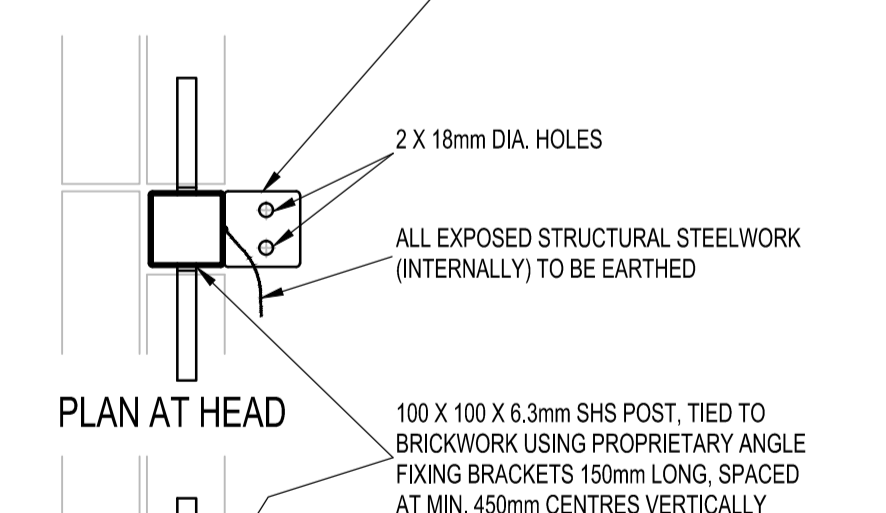
LINTOL TO CABLE SLOT SCALE 1:10



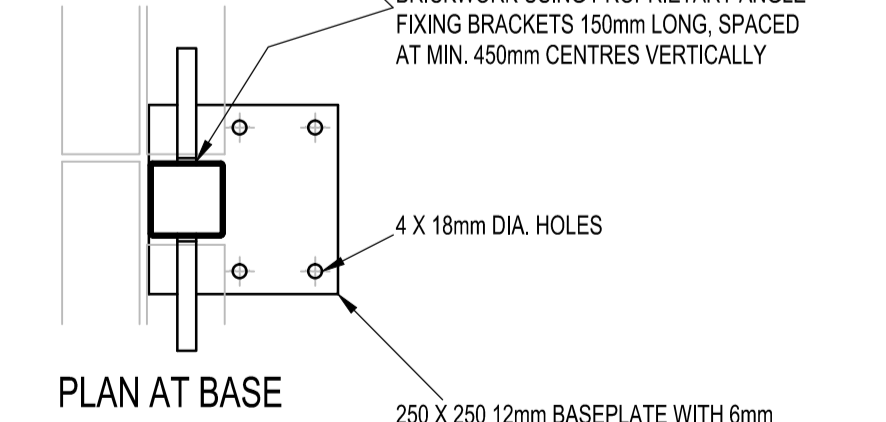
FOUNDATION PLAN



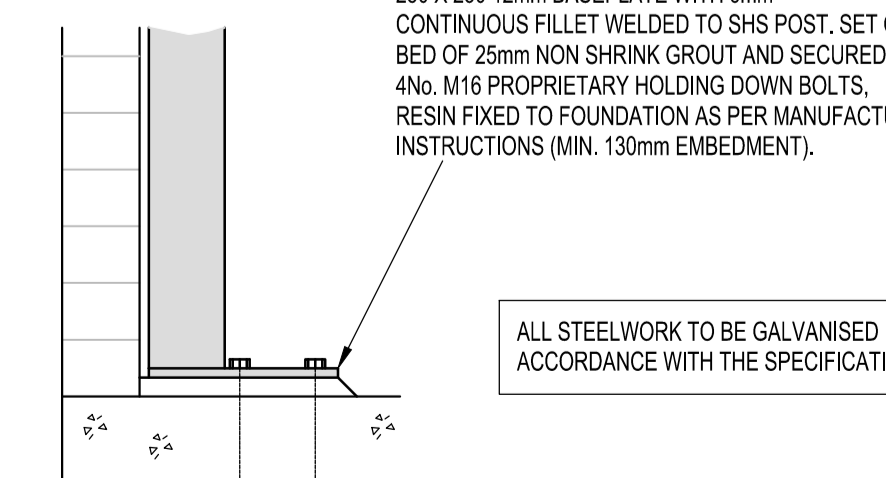
HEAD SECTION



PLAN AT HEAD



PLAN AT BASE



BASE SECTION

STRUCTURAL STEELWORK DETAIL SCALE 1:10

General
This drawing is to be read in conjunction with document SUB-03-017 General Specification for the Civil Engineering and Building Design and Construction of Secondary Substations. It is the contractor's responsibility to confirm, before construction, that the details on this drawing are correct as per SUB-03-017.

This is a generic guidance drawing that is deemed suitable for construction. However the constructor should consider all site specific risk that will affect the design and operation of the substation. Proposed substation details are to be submitted for acceptance before installation.

Details shown on this drawing are typical for this type of substation building but may not be suitable for substations housing alternative equipment. The constructor shall satisfy themselves that the appropriate details shown are correct depending on the type of substation being constructed.

Concrete
General
The concrete shall be in accordance with the specification and attain the relevant cub crushing strength at 28 days.

Foundations (Concrete 40N/mm² 28-Day Cube Strength)
Foundations are to be set on undisturbed inorganic strata that provide the required minimum design safe ground bearing capacity. Minimum bearing capacity to be 75kN/m².

Floor (Concrete 40N/mm² 28-Day Cube Strength)
Floors of substations housing indoor switchedgear shall have a visqueen damp proof membrane installed where graded stone infill is used. A flat, level and smooth floor surface is essential for installation of plant. Tolerances to finished level expressed as a maximum permissible deviation beneath a straight edge with feet placed anywhere on the floor shall not exceed 1mm in 1m or 3mm in 3m. Floors to be cured, prepared & painted with 2 No. Coats of non-slip floor paint on completion.

Brickwork
General
All brickwork below D.P.C. to be H.D. category 1 min. 75N/mm² mean compressive strength and max 7% M.A. and durability designation F2 S2 (Ex Engineering Brickwork Class B) in English bond except for exposed faces. External facing brickwork to be H.D. category 1 min. 30N/mm² mean compressive strength and max 12% M.A. and durability designation F1 S1 or better. Internal facing brickwork to fair faced smooth textured solid concrete bricks, sized to match external facing bricks and with a mean compressive strength of not less than 20N/mm². Class iii mortar.

Walls
Walls shall be 215mm English garden wall bond or Collar jointed stretcher bond. Leaves of collar jointed double stretcher walls to be tied together by means of type 1 or type 2 stainless steel ties laid in every fourth course at 375mm centres and set back 38mm from outer face, ties are to be staggered.

SHS windposts shall be installed on the front and rear wall panels.

Doors
Details of proposed doors shall be submitted to SPEN for comment, before work commences. Proprietary GRP faced aluminium or steel security doors are the preferred option, unless stated otherwise. An alternative option for hardwood doors (see Drg SP4000543 for details) or GRP doors is also available.

Cable Trench & Slots/Ramp
On completion of cabling, cable trench to be filled with dry sand and skimmed with minimum 50mm depth of sand/cement screed over a visqueen membrane (top to be level with FFL).

Roof
Standard Concrete Roofs (Concrete 40N/mm² 28-Day Cube Strength)
Wherever practicable, roofs should be cast in situ reinforced concrete construction with a soffit finish. Slip joints shall be incorporated at wall bearings, polysulphide sealed externally. Internal / External faces of concrete to be fair faced. All external faces to be cured, prepared, primed and finished with a two coat high performance (Aliphatic) polyurethane waterproofing system (flat roof grade) with glass fibre mat reinforcement to initial coat, e.g.

- 1.No. Coat of LPL bonding primer then
- 2.No. Coats of LPL Decothane.

Obtainable from Liquid Plastics Tel. 01772 259 781 or Equal System

All finishes are to be in accordance with the manufacturers recommendations.

Where permanent structural metal soffit shutters are used as part of a composite roof system these shall be corrosion resistant and the Constructor's proposals for screening or tagging for earthing purposes shall be expressly agreed with SPEN prior to construction.

Ventilation
Ventilation shown is typical for a double 500kVA transformer substation. Ventilation unit opening sizes for 1000kVA transformers shall be a minimum 1002 x 450mm. The typical ventilation indicated may not be adequate in certain supply conditions which might require additional or alternative ventilation arrangements.

Steelwork
All steelwork is to be hot dipped galvanised in accordance with the specification and shall provide fixings for earthing.

Related Typical Deemed to Satisfy Drawings

- Hardwood Doors SP4000543
- Meter Cupboards SP4078901
- Vent for brickbuilt substation SP4000542

Rev. 3.0	Date 27/11/17	GENERAL UPDATES TO REFLECT CHANGES TO CIVILS POLICY DOCUMENT	
Drawn C.B.	Checked G.R.	Approved G.R.	



SP PowerSystems Ltd
System Design, Drawing Office
3 Prenton Way, Prenton, CH43 3ET
Telephone 0151 6092491

TYPICAL TRADITIONAL BUILDING DETAILS FOR 11kV BRICK BUILT SUBSTATION (DOUBLE SIDE BY SIDE)

Location					
STANDARDS					
Drawn	Date	Checked	Date	Approved	Date
M.T.	JAN.09	A.J.R.	JAN.09	C.W	JAN.09
Status	Drg. No.			Rev.	
ISSUED	SP4053389			3.0	
© Copyright property of SP PowerSystems Ltd.					Scale 1:50
					Size A1

NOTES

General
This drawing is to be read in conjunction with document SUB-03-017 General Specification for the Civil Engineering and Building Design and Construction of Secondary Substations. It is the constructor's responsibility to confirm, before construction, that the details on this drawing are correct as per SUB-03-017.

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Internal facing brickwork to fair faced smooth textured solid concrete bricks, sized to match external facing bricks and with a mean compressive strength of not less than 20N/mm². Class iii mortar.

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An alternative option for hardwood doors (see Drg SP4000543 for details) or GRP doors is also available.

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1.No. Coat of LPL bonding primer then
2.No. Coats of LPL Decothane.

Obtainable from Liquid Plastics Tel. 01772 259 781 or Equal System

All finishes are to be in accordance with the manufacturers recommendations.

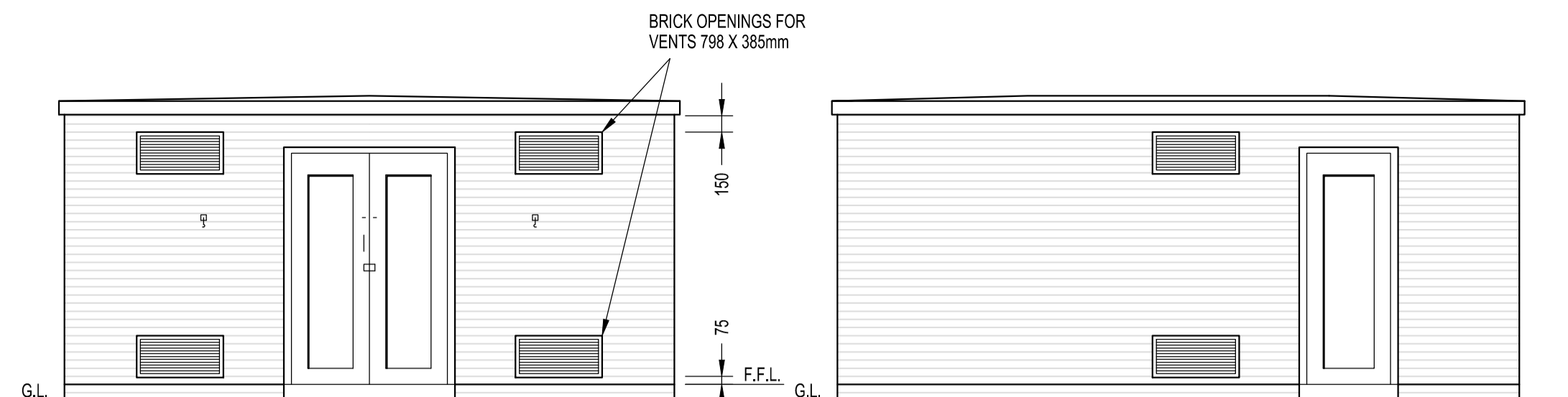
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Related Typical Deemed to Satisfy Drawings

Hardwood Doors SP4000543
Meter Cupboards SP4078901
Vent for Brickbuilt substation SP4000542



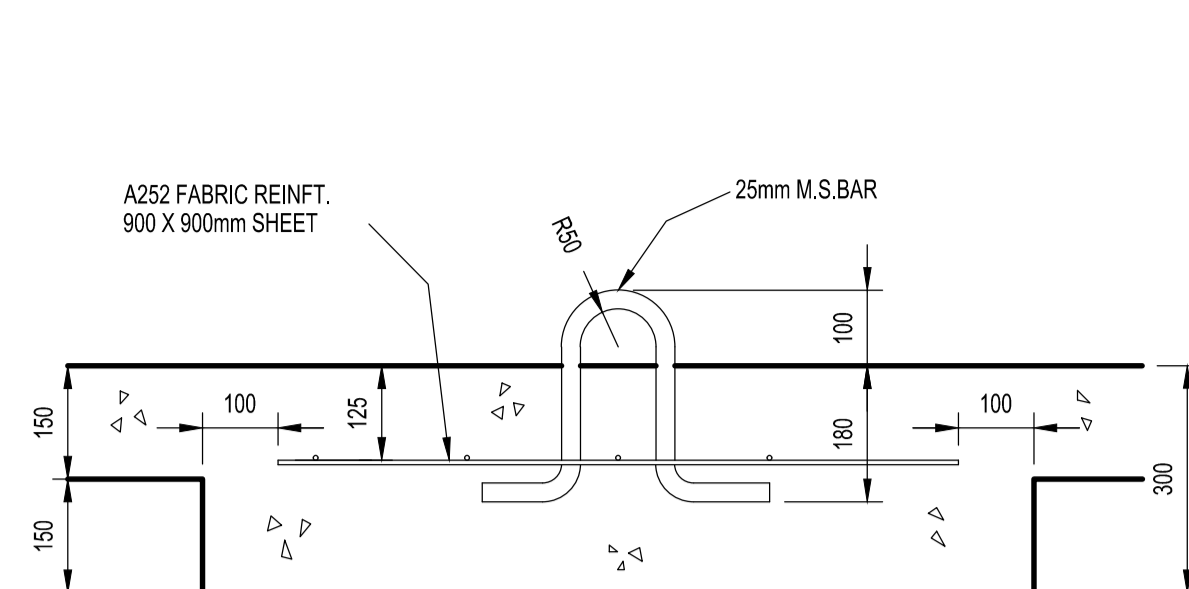
FRONT ELEVATION SCALE 1:50

SIDE ELEVATION SCALE 1:50

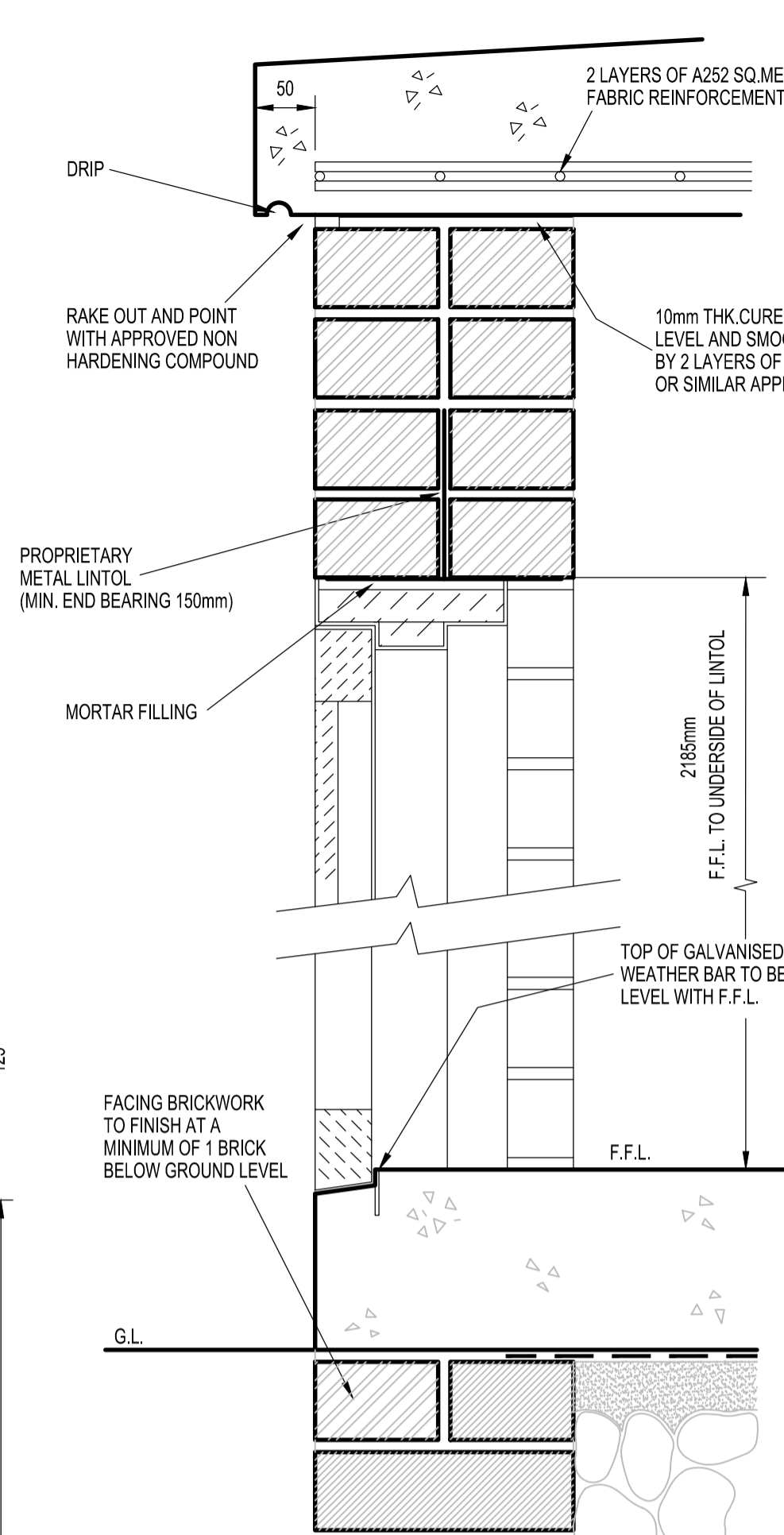


REAR ELEVATION SCALE 1:50

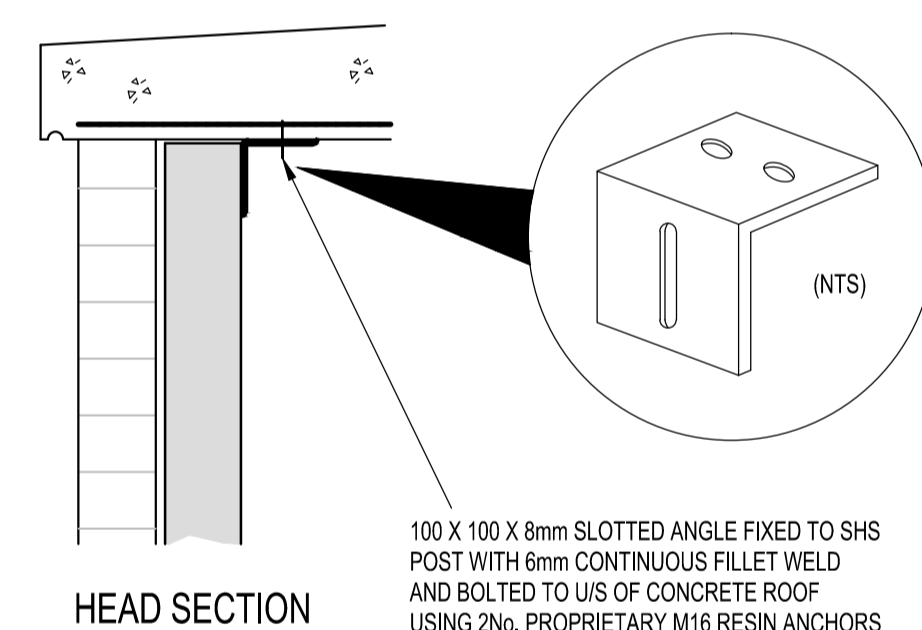
SIDE ELEVATION SCALE 1:50



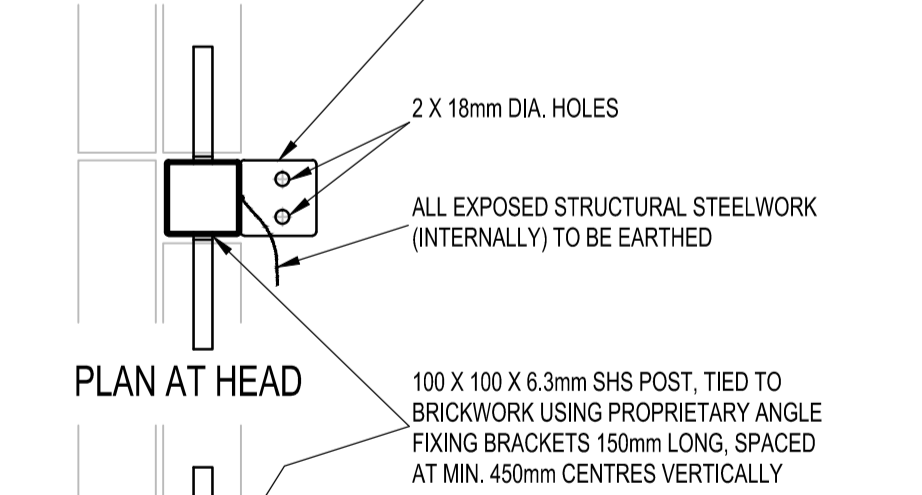
DETAIL OF HAULAGE EYES (2No REQD.) SCALE 1:10



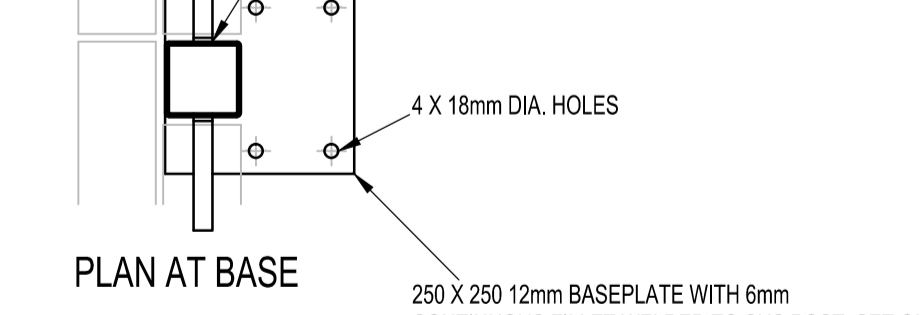
SECTION THROUGH DOORWAY AND ROOF SCALE 1:5



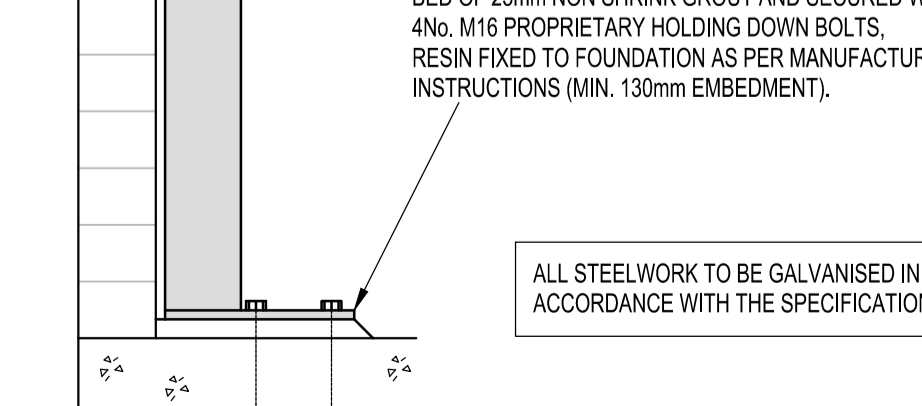
HEAD SECTION



PLAN AT HEAD

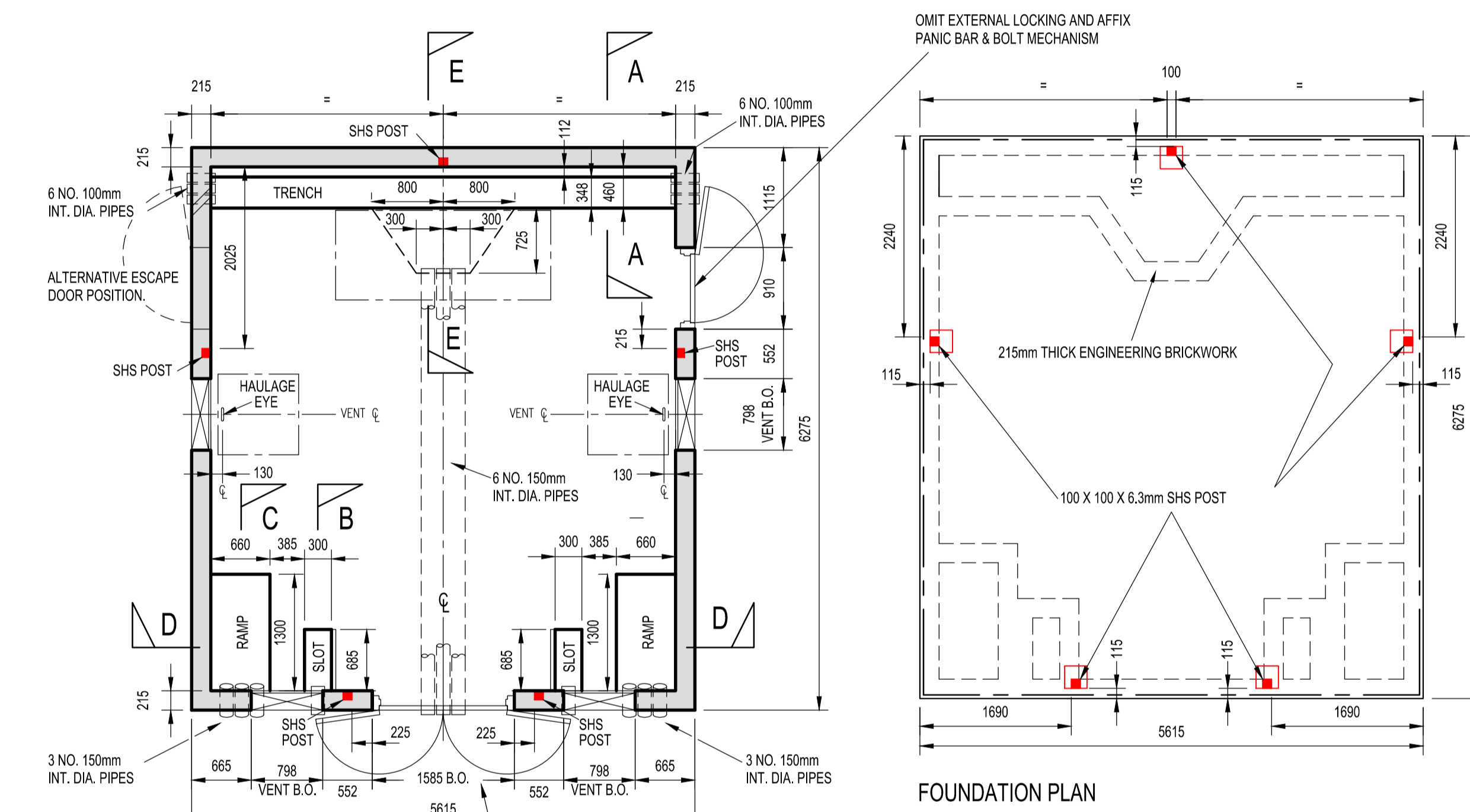


PLAN AT BASE

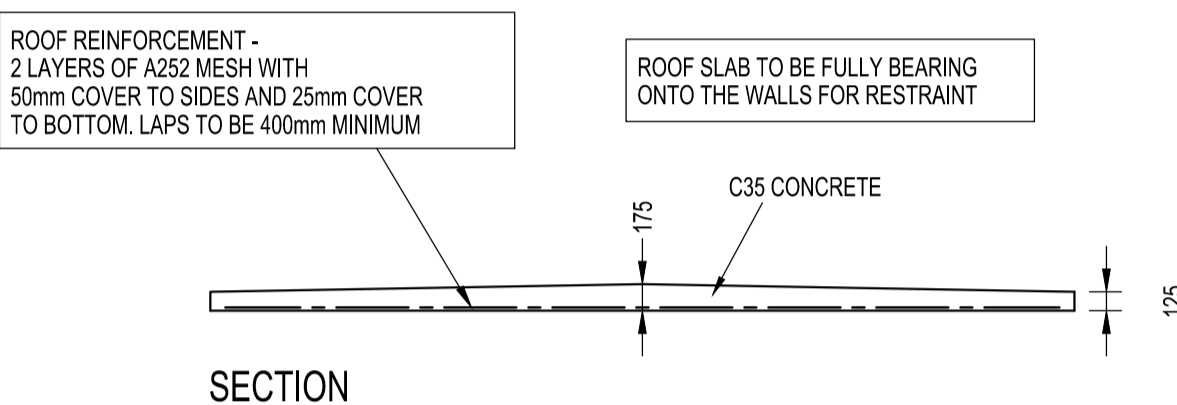


BASE SECTION

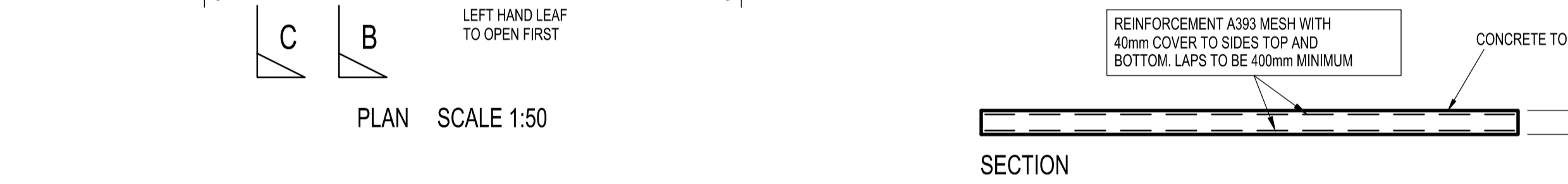
STRUCTURAL STEELWORK DETAIL SCALE 1:10



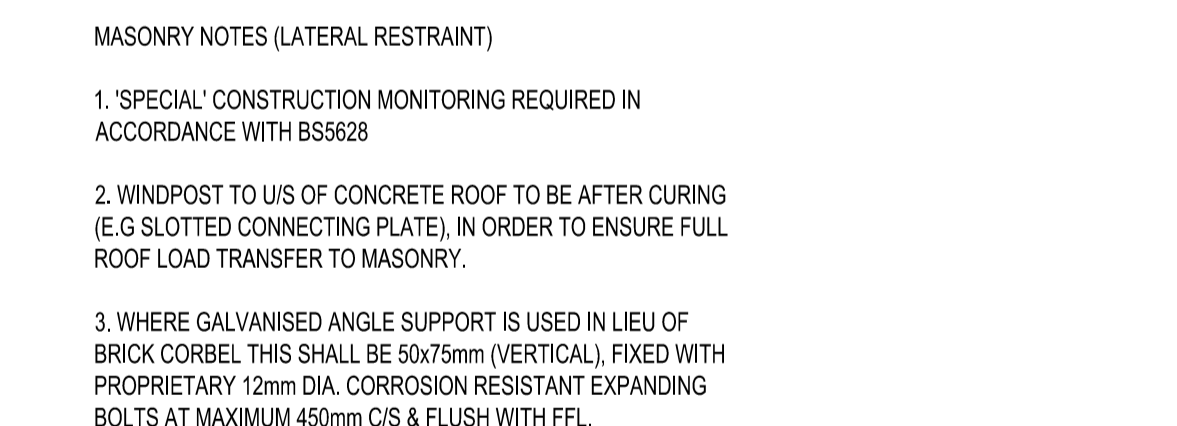
FOUNDATION PLAN



ROOF PLAN SCALE 1:50

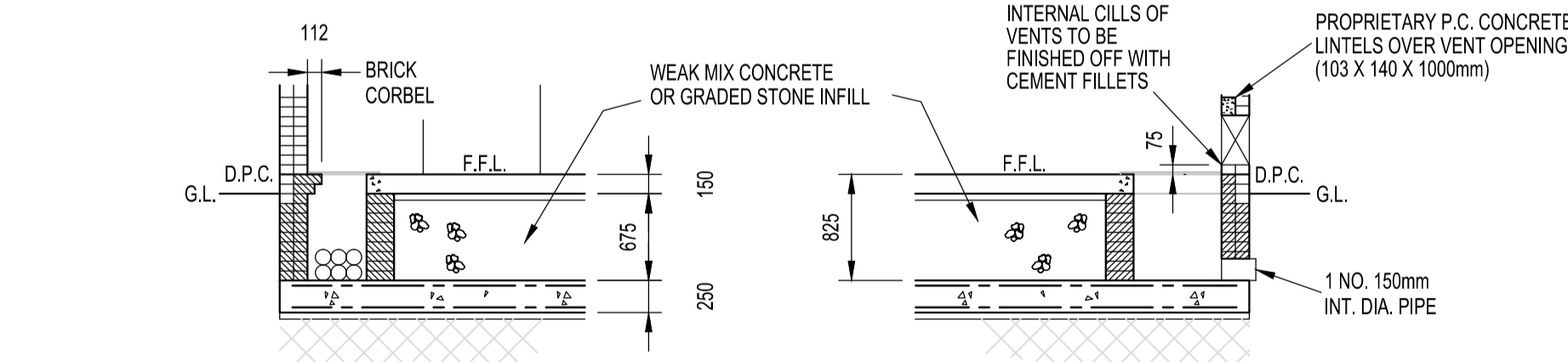


SECTION

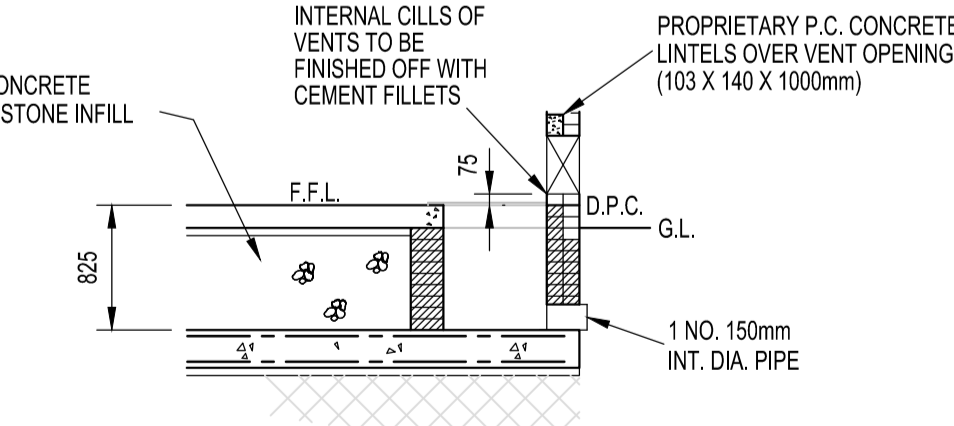


MASONRY NOTES (LATERAL RESTRAINT)

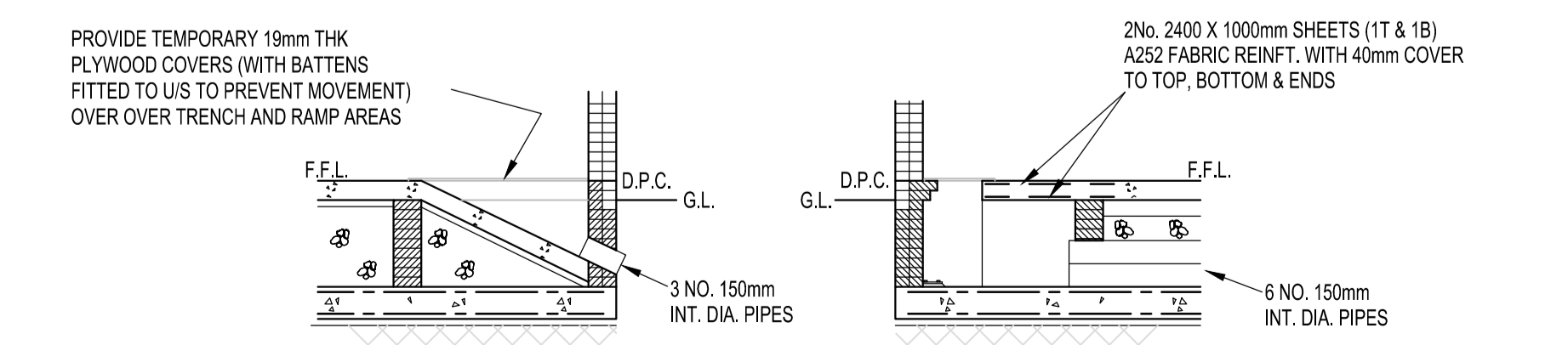
- 'SPECIAL' CONSTRUCTION MONITORING REQUIRED IN ACCORDANCE WITH BS5628
- WINDPOST TO UIS OF CONCRETE ROOF TO BE AFTER CURING (E.G SLOTTED CONNECTING PLATE), IN ORDER TO ENSURE FULL ROOF LOAD TRANSFER TO MASONRY.
- WHERE GALVANISED ANGLE SUPPORT IS USED IN LIEU OF BRICK CORBEL THIS SHALL BE 50x75mm (VERTICAL), FIXED WITH PROPRIETARY 12mm DIA. CORROSION RESISTANT EXPANDING BOLTS AT MAXIMUM 450mm C/S & FLUSH WITH FFL.



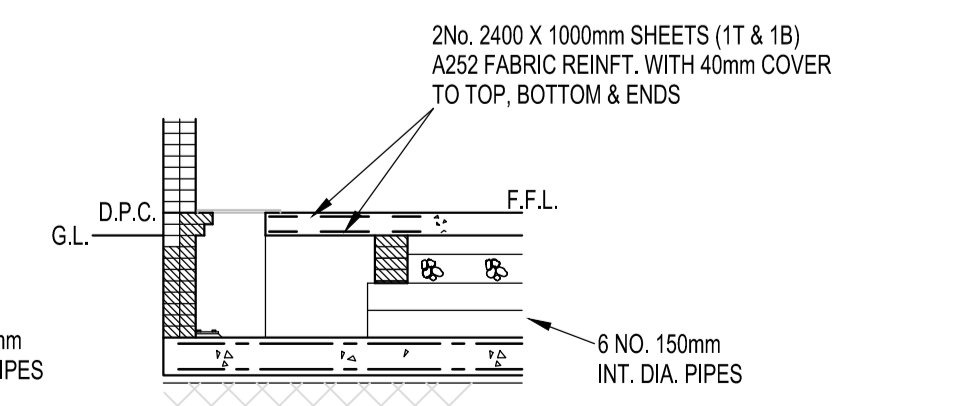
SECTION A-A SCALE 1:50



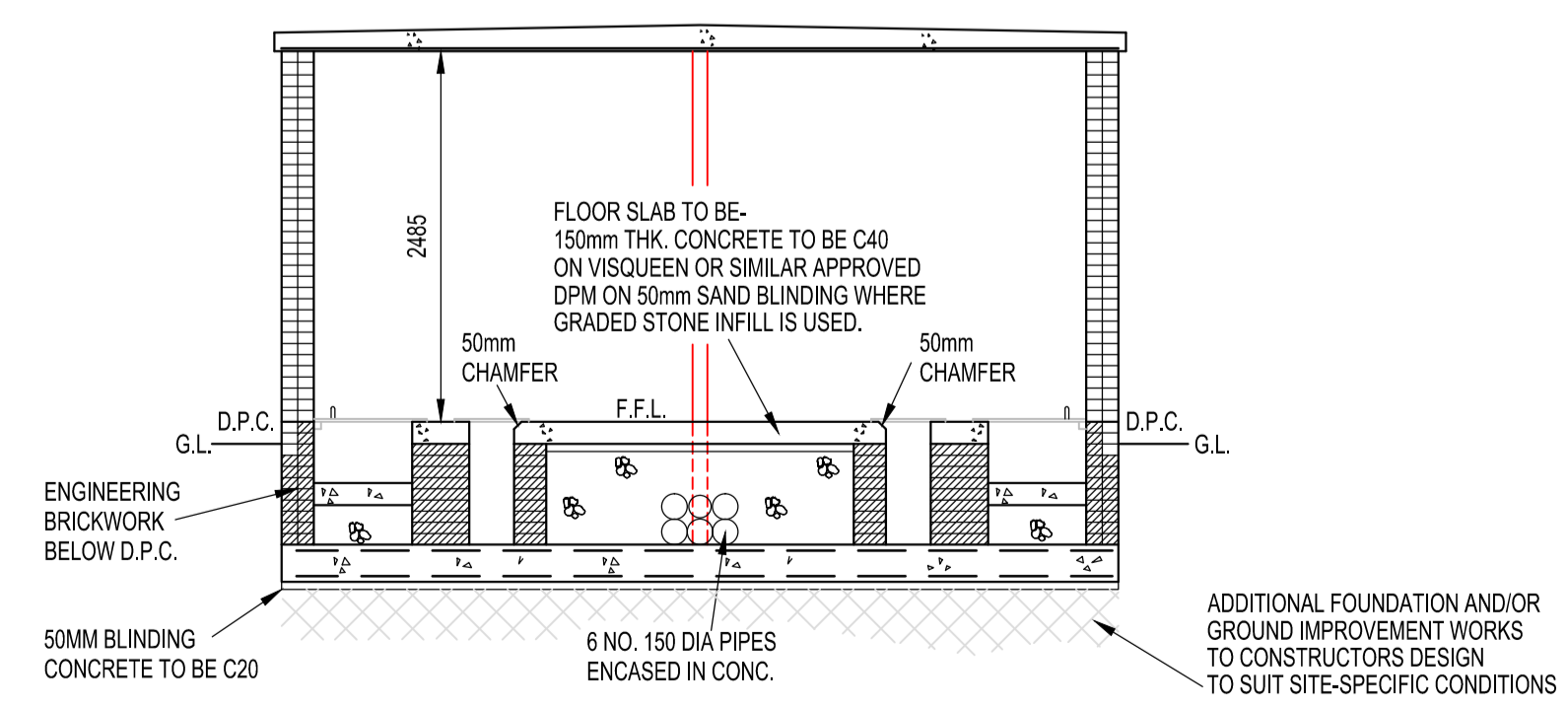
SECTION B-B SCALE 1:50



SECTION C-C SCALE 1:50



SECTION E-E SCALE 1:50



SECTION D-D SCALE 1:50

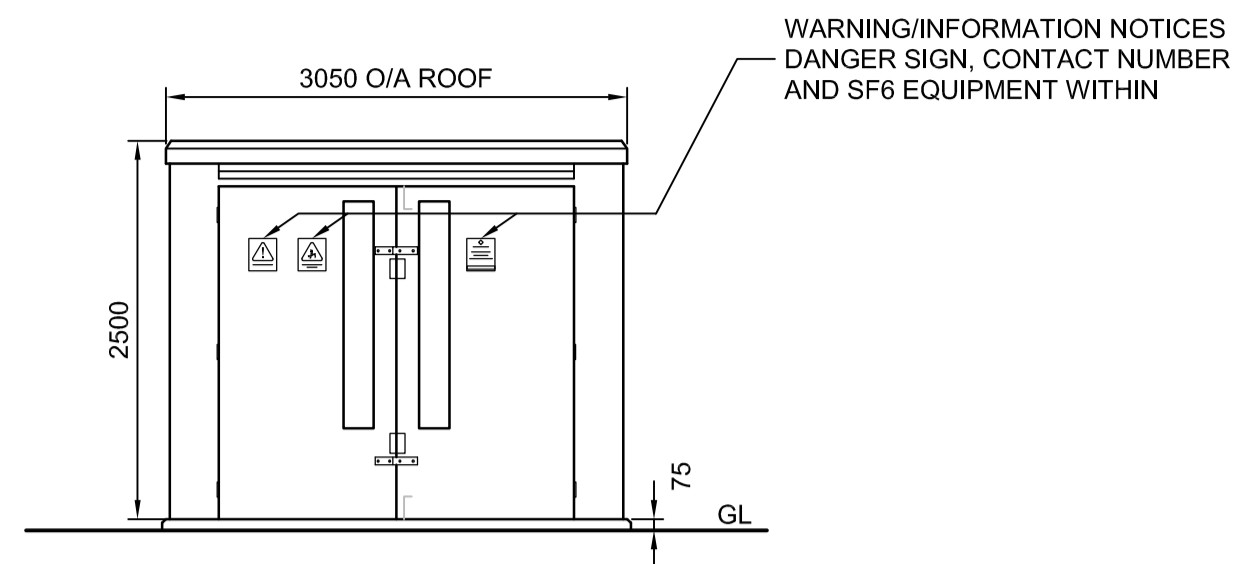
Rev. 3.0	Date 27/11/17	GENERAL UPDATES TO REFLECT DETAILS TO CIVILS POLICY DOCUMENT
Drawn C.B.		
Checked G.R.		
Approved G.R.		



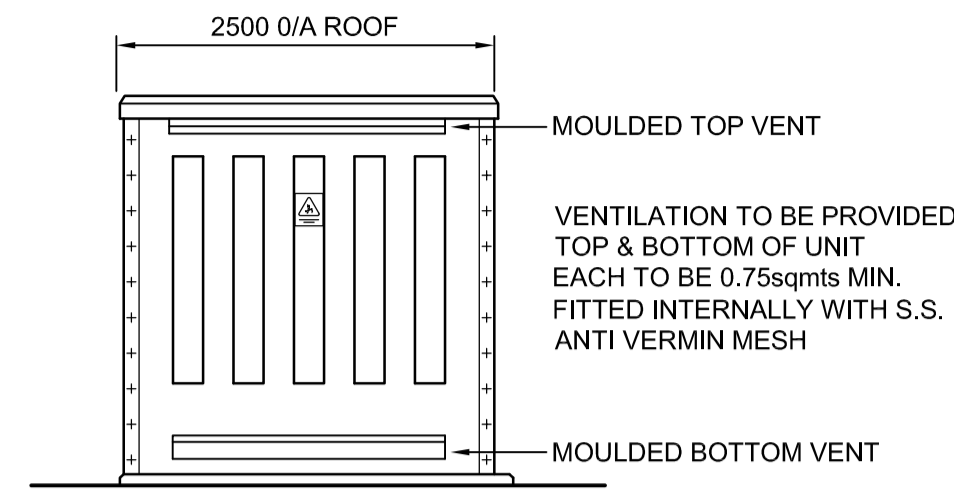
SP PowerSystems Ltd
System Design, Drawing Office
3 Prenton Way, Prenton, CH43 3ET
Telephone 0151 6092491

TYPICAL TRADITIONAL BUILDING DETAILS FOR 11kV BRICK BUILT SUBSTATION (DOUBLE SQUARE TYPE)

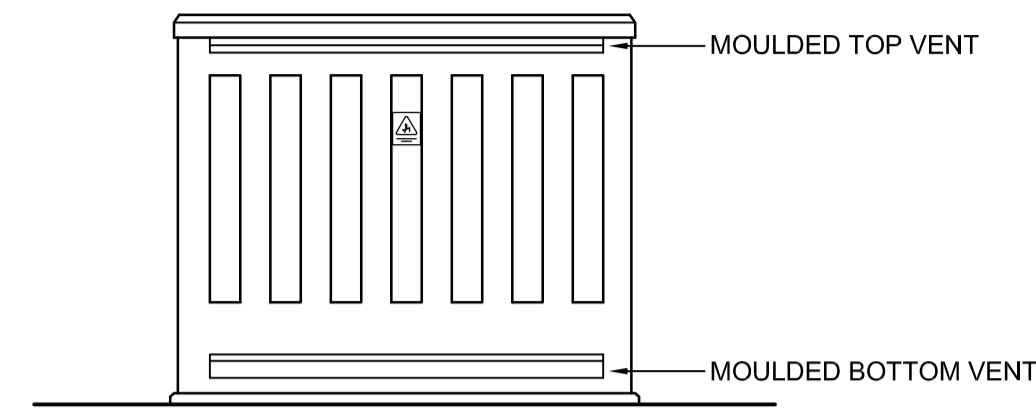
Standards					
Drawn	Date	Checked	Date	Approved	Date
M.T.	MARCH 09	C.W.	MARCH 09	A.J.R.	MARCH 09
Status	Issued			Scale	AS SHOWN
	SP4058664			Size	A1
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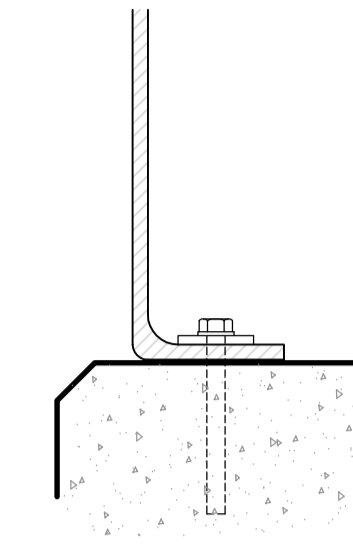
FRONT ELEVATION



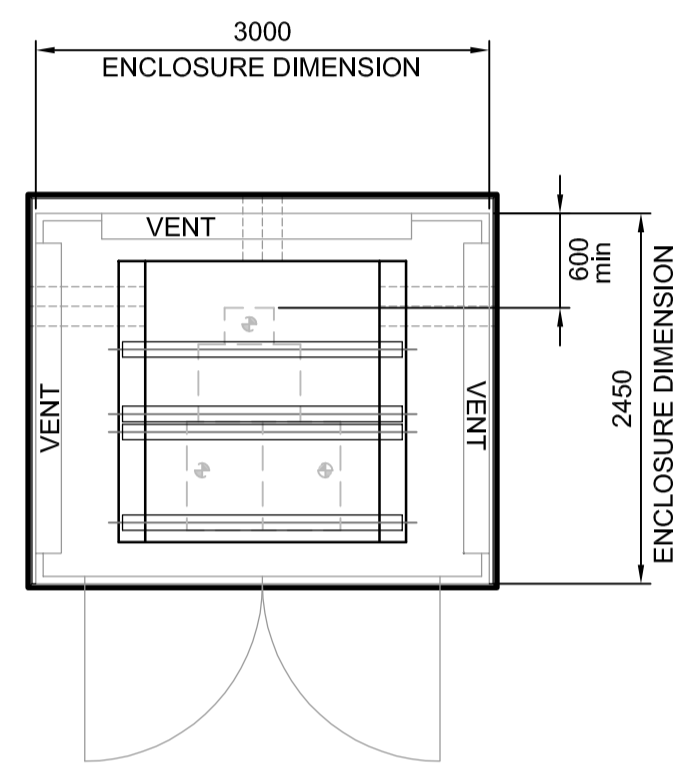
SIDE ELEVATION
OPPOSITE SIDE IDENTICAL



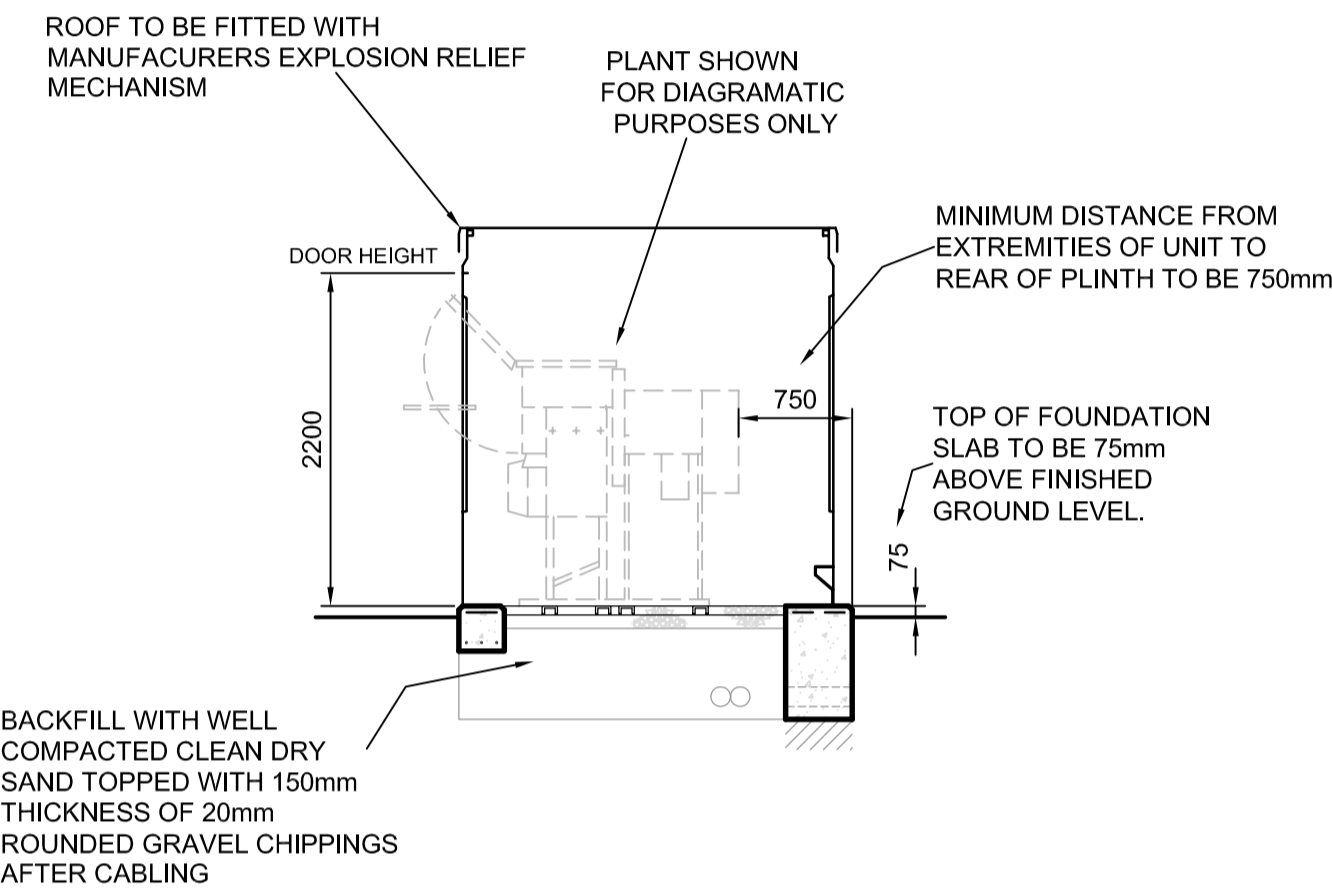
REAR ELEVATION



TYPICAL HOLDING DOWN DETAIL

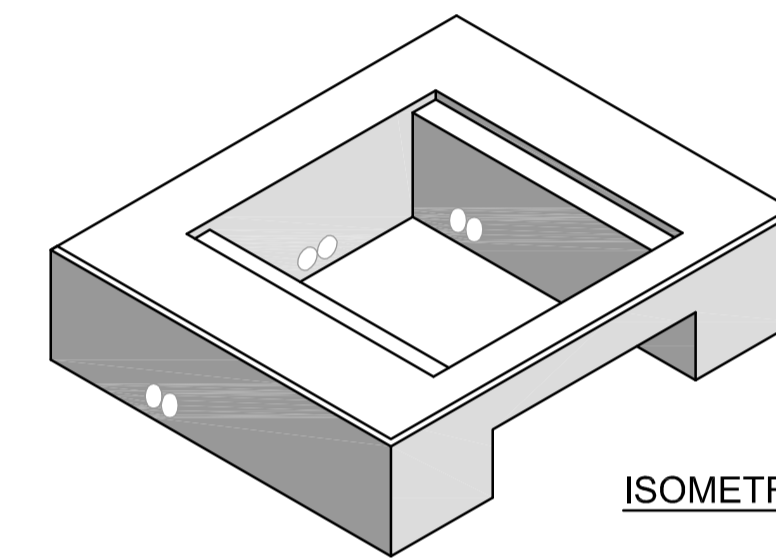


PLANT LAYOUT PLAN



PLANT SECTION

ENCLOSURE ONLY SUITABLE WHEN ERECTED AT A DISTANCE OF ONE METRE OR GREATER FROM BOUNDARY



ISOMETRIC VIEW

NOTES

CONCRETE
THE CONCRETE TO BE IN ACCORDANCE WITH THE SPECIFICATION AND ATTAIN THE RELEVANT CUBE CRUSHING STRENGTH AT 28 DAYS.

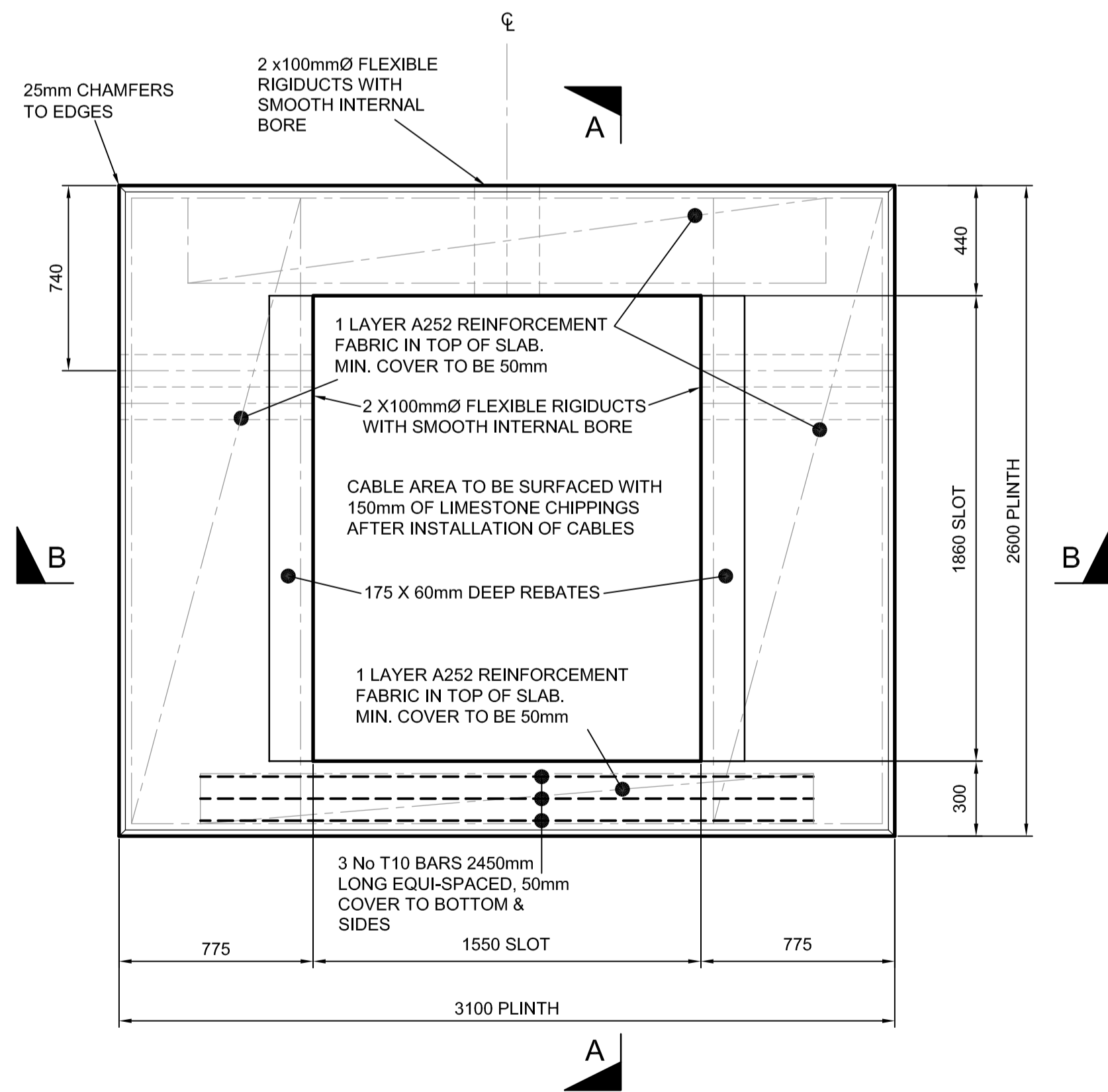
EARTHWORKS
PLINTH TO BE SET ON UNDISTURBED INORGANIC STRATA THAT PROVIDE THE REQUIRED MINIMUM DESIGN SAFE GROUND BEARING CAPACITY.

PLINTH (CONCRETE 40N/mm² 28 DAY CUBE STRENGTH) A FLAT, LEVEL AND SMOOTH FLOOR SURFACE IS ESSENTIAL FOR INSTALLATION OF PLANT. TOLERANCE TO FINISHED LEVEL EXPRESSED AS A MAXIMUM PERMISSIBLE DEVIATION BENEATH A STRAIGHT EDGE WITH FEET PLACED ANYWHERE ON THE FLOOR SHALL NOT EXCEED 1mm IN 1M OR 3mm IN 3M.

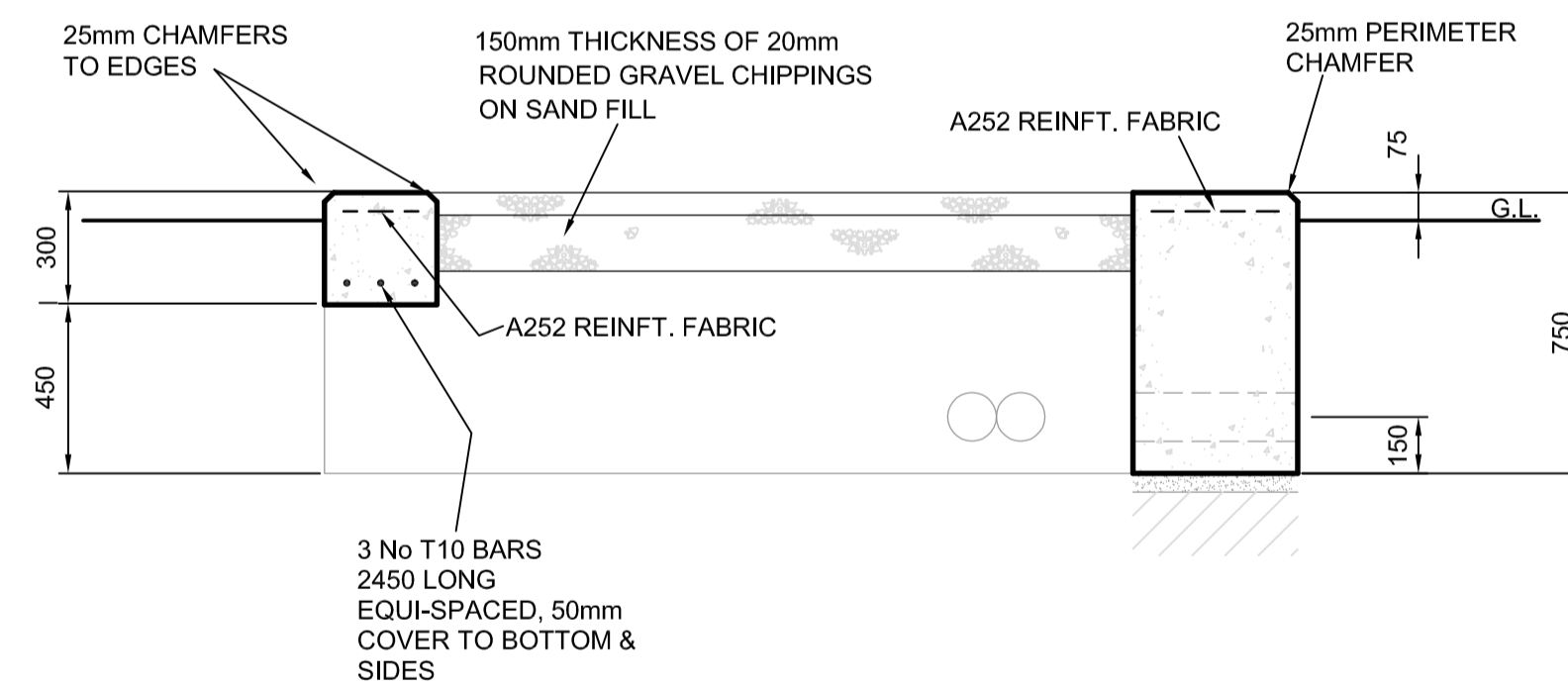
CABLE SLOT
ON COMPLETION OF CABLING, CABLE AREA TO BE FILLED WITH DRY SAND AND TOPPED WITH 150mm DEPTH OF 20mm ROUNDED GRAVEL CHIPPINGS

FOUNDATION & FLOOR LAYOUT DETAILS INDICATED ARE TYPICAL FOR UNIT SUBSTATIONS HOUSING OUTDOOR EQUIPMENT AND WOULD NOT THEREFORE BE APPLICABLE TO OTHER SUBSTATION TYPES.

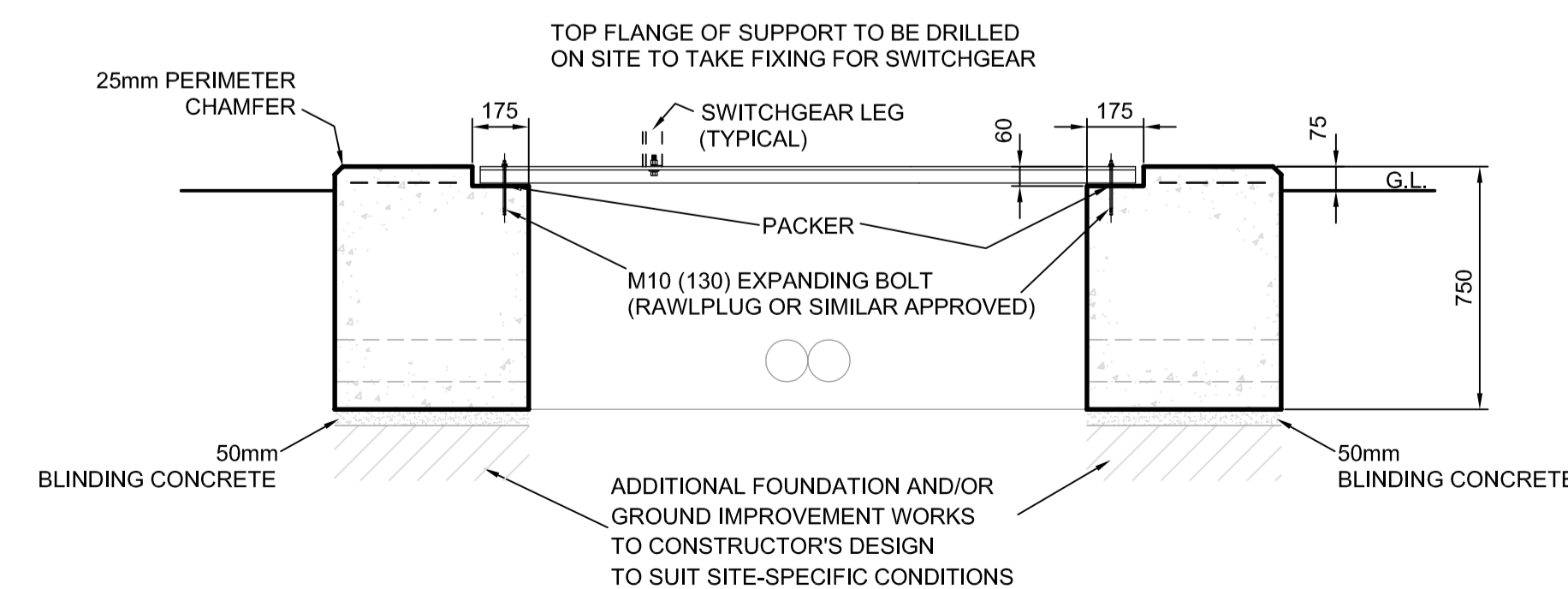
THIS DRAWING TO BE READ IN CONJUNCTION WITH SUB-03-017 'GENERAL SPECIFICATION FOR THE CIVIL ENGINEERING AND BUILDING DESIGN AND CONSTRUCTION OF SECONDARY SUBSTATIONS'



FOUNDATION PLAN
SCALE 1:20



SECTION A - A
SCALE 1:20



SECTION B - B
SCALE 1:20

Rev. 2.0	Date 25/7/13	AMENDED FROM SITE SPECIFIC TO GENERAL USE DRAWING
Drawn M.T.	Checked G.D.	Approved B.M.

SP ENERGY NETWORKS

SP PowerSystems Ltd
System Design, Drawing Office
3 Prenton Way, Prenton, CH43 3ET
Telephone 0151 6092491

TITLE
TYPICAL FOUNDATION PLINTH FOR 11KV 'D' TYPE UNIT SUBSTATION WITH 3.0 X 2.45M GRP ENCLOSURE.

Location AS REQUIRED					
Drawn M.T.	Date MARCH 13	Checked G.D.	Date MARCH 13	Approved B.M.	Date MARCH 13
Status FOR ISSUE			Drg. No. SP4102117		Rev. 2.0
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NOTES

General
This drawing is to be read in conjunction with document SUB-03-017 General Specification for the Civil Engineering and Building Design and Construction of Secondary Substations. It is the constructor's responsibility to confirm, before construction, that the details on this drawing are correct as per SUB-03-017.

This is a generic guidance drawing that is deemed suitable for construction. However the constructor should consider all site specific risk that will affect the design and operation of the substation. Proposed substation details are to be submitted for acceptance before installation.

Details shown on this drawing are typical for this type of substation building but may not be suitable for substations housing alternative equipment. The constructor shall satisfy themselves that the appropriate details shown are correct depending on the type of substation being constructed.

Concrete

General
The concrete shall be in accordance with the specification and attain the relevant cube crushing strength at 28 days.

Foundations (Concrete 40N/mm² 28-Day Cube Strength)
Foundations are to be set on undisturbed inorganic strata that provide the required minimum design safe ground bearing capacity. Minimum bearing capacity to be 75kN/m².

Floor (Concrete 40N/mm² 28-Day Cube Strength)
A flat, level and smooth floor surface is essential for installation of plant. Tolerances to finished level expressed as a maximum permissible deviation beneath a straight edge with feet placed anywhere on the floor shall not exceed 1mm in 1m or 3mm in 3m. Floors to be cured, prepared & painted with 2 No. Coats of non-slip floor paint on completion.

Brickwork

General
All brickwork below D.P.C. to be H.D. category 1 min. 75N/mm² mean compressive strength and max 7% M.A. and durability designation F2 S2 (Ex Engineering Brickwork Class B) in English bond except for exposed faces.
External facing brickwork to be H.D. category 1 min. 30N/mm² mean compressive strength and max 12% M.A. and durability designation F1 S1 or better.
Internal facing brickwork to fair faced smooth textured solid concrete bricks, sized to match external facing bricks and with a mean compressive strength of not less than 20N/mm². Class iii mortar.

Walls
Walls shall be 215mm English garden wall bond or Collar jointed stretcher bond. Leaves of collar jointed double stretcher walls to be tied together by means of type 1 or type 2 stainless steel ties laid in every fourth course at 375mm centres and set back 38mm from outer face, ties are to be staggered.

Doors

Details of proposed doors shall be submitted to SPEN for comment, before work commences.
Proprietary GRP faced aluminium or steel security doors are the preferred option, unless stated otherwise.
An alternative option for hardwood doors (see Drg SP4000543 for details) or GRP doors is also available.

Cable Trench & Slots

On completion of cabling, cable trench and slots to be filled with dry sand topped with a minimum 150mm depth of rounded gravel chippings (top to be level with FFL).

Roof

Standard Concrete Roofs (Concrete 40N/mm² 28-Day Cube Strength)
Wherever practicable, roofs should be cast in situ reinforced concrete construction with a soffit finish. Slip joints shall be incorporated at wall bearings, polysulphide sealed externally. Internal / External faces of concrete to be fair faced. All external faces to be cured, prepared, primed and finished with a two coat high performance (Aliphatic) polyurethane waterproofing system (flat roof grade) with glass fibre mat reinforcement to initial coat, e.g.

- 1No. Coat of LPL bonding primer then
- 2No. Coats of LPL Decothane.

Obtainable from Liquid Plastics Tel. 01772 259 781 or Equal System

All finishes are to be in accordance with the manufacturers recommendations.

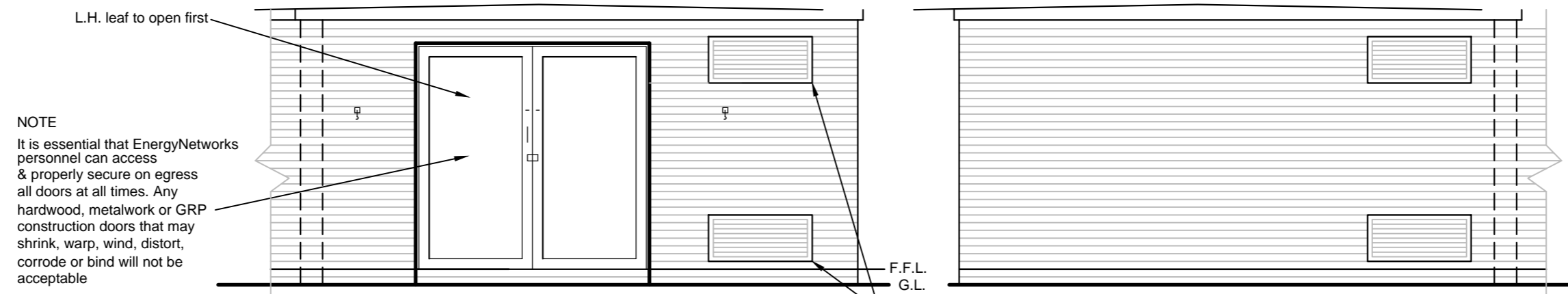
Where permanent structural metal soffit shutters are used as part of a composite roof system these shall be corrosion resistant and the Constructor's proposals for screening or tagging for earthing purposes shall be expressly agreed with SPEN prior to construction.

Ventilation

Ventilation shown is typical for a single 500kVA transformer substation. Ventilation unit opening sizes for 1000kVA transformers shall be a minimum 1002 x 450mm. The typical ventilation indicated may not be adequate in certain supply conditions which might require additional or alternative ventilation arrangements.

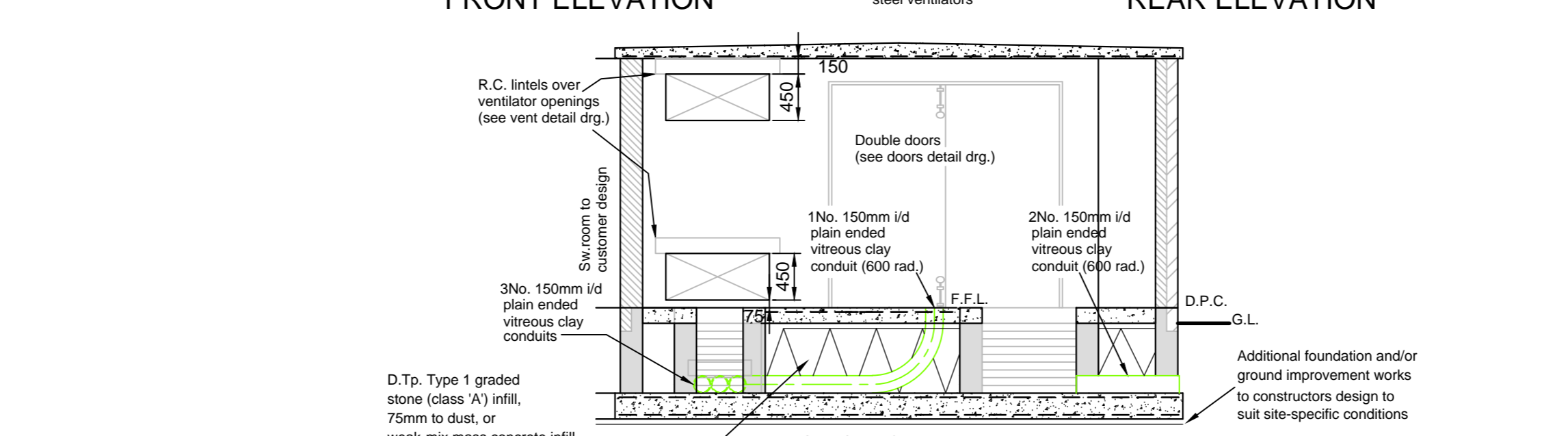
Related Typical Deemed to Satisfy Drawings

- Hardwood Doors SP4000543
- Meter Cupboards SP4078901
- Vent for Brickbuilt substation SP4000542

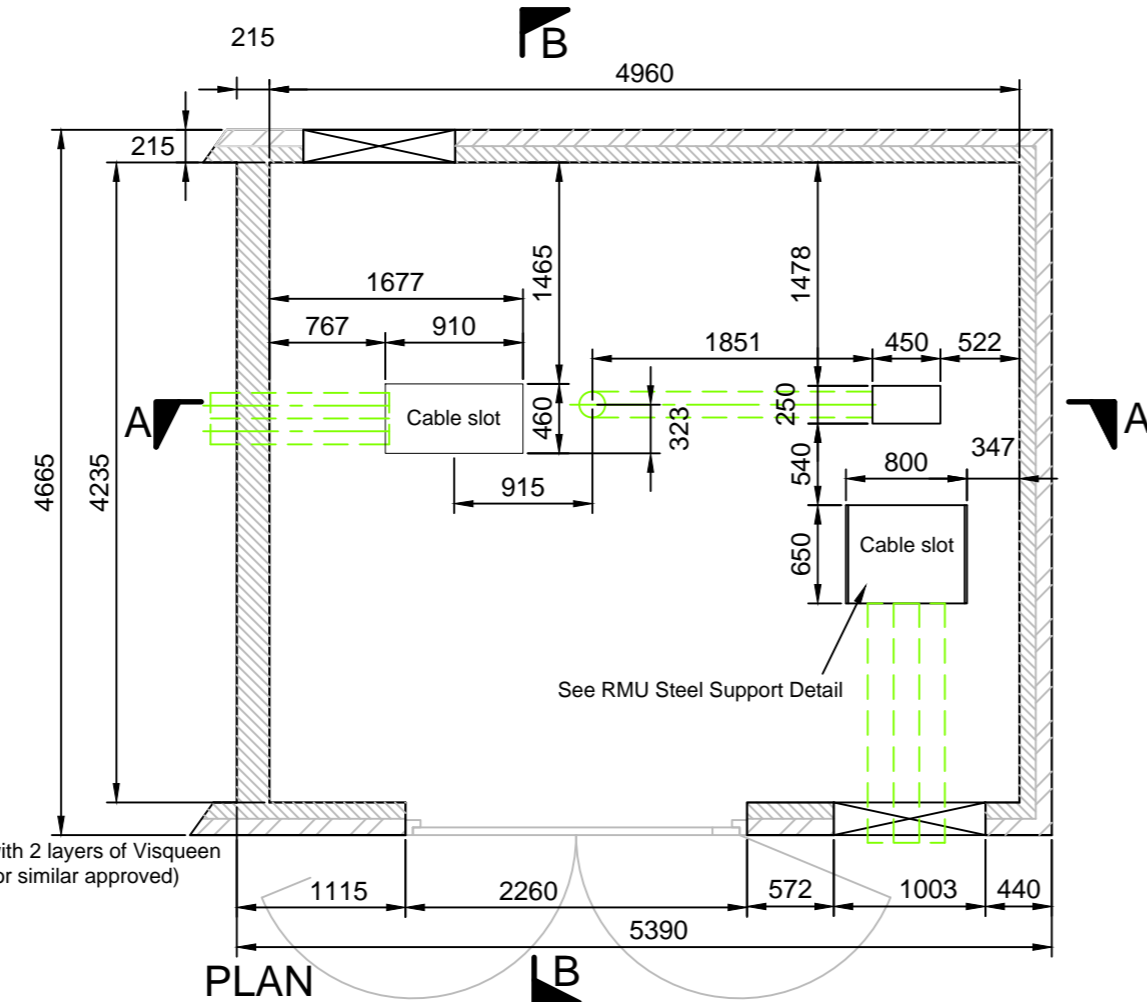


FRONT ELEVATION

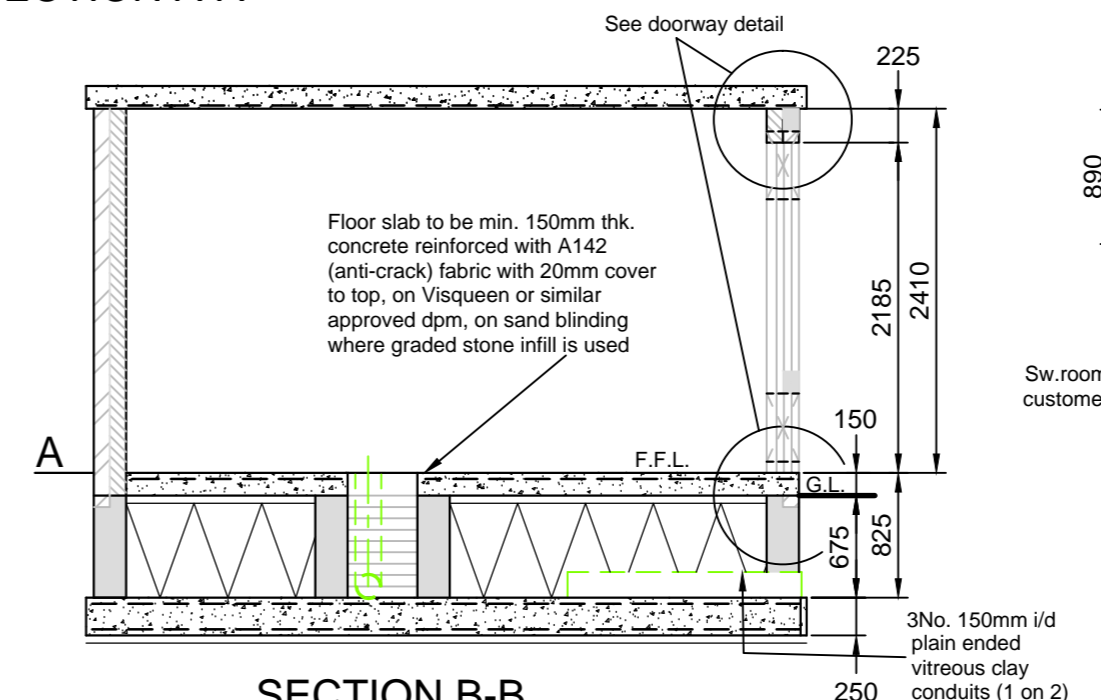
REAR ELEVATION



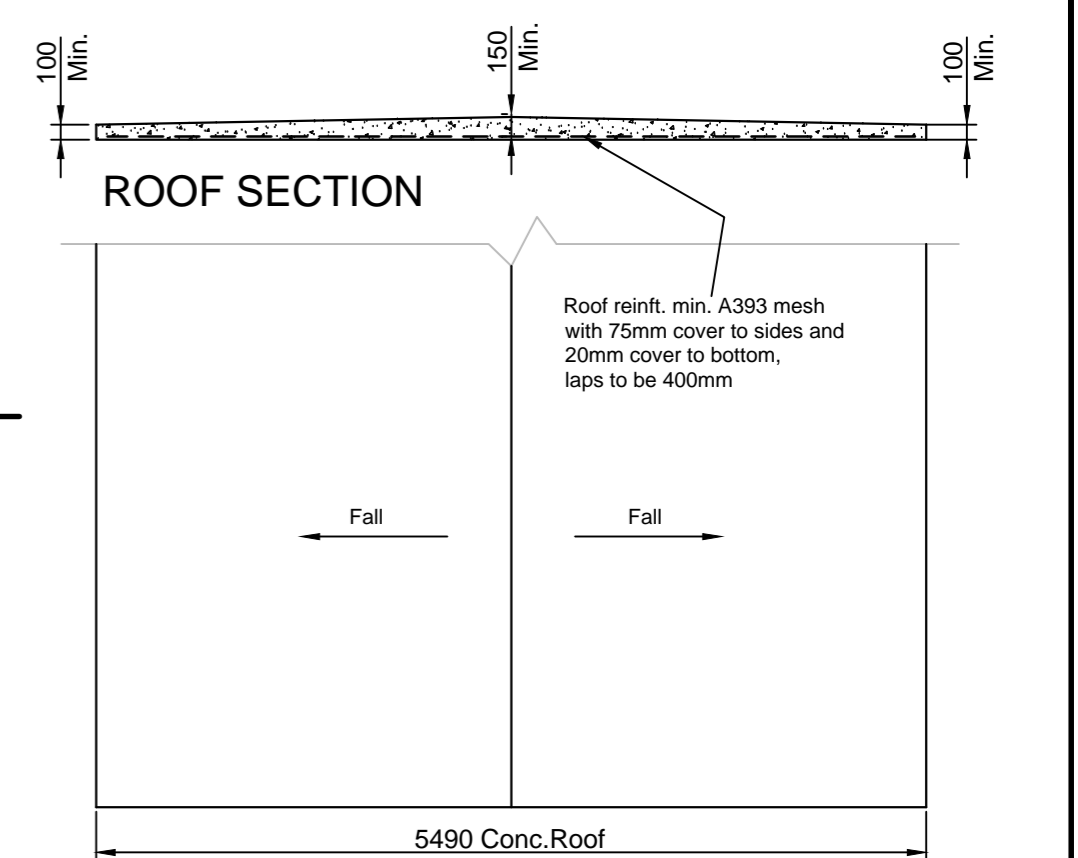
SECTION A-A



PLAN

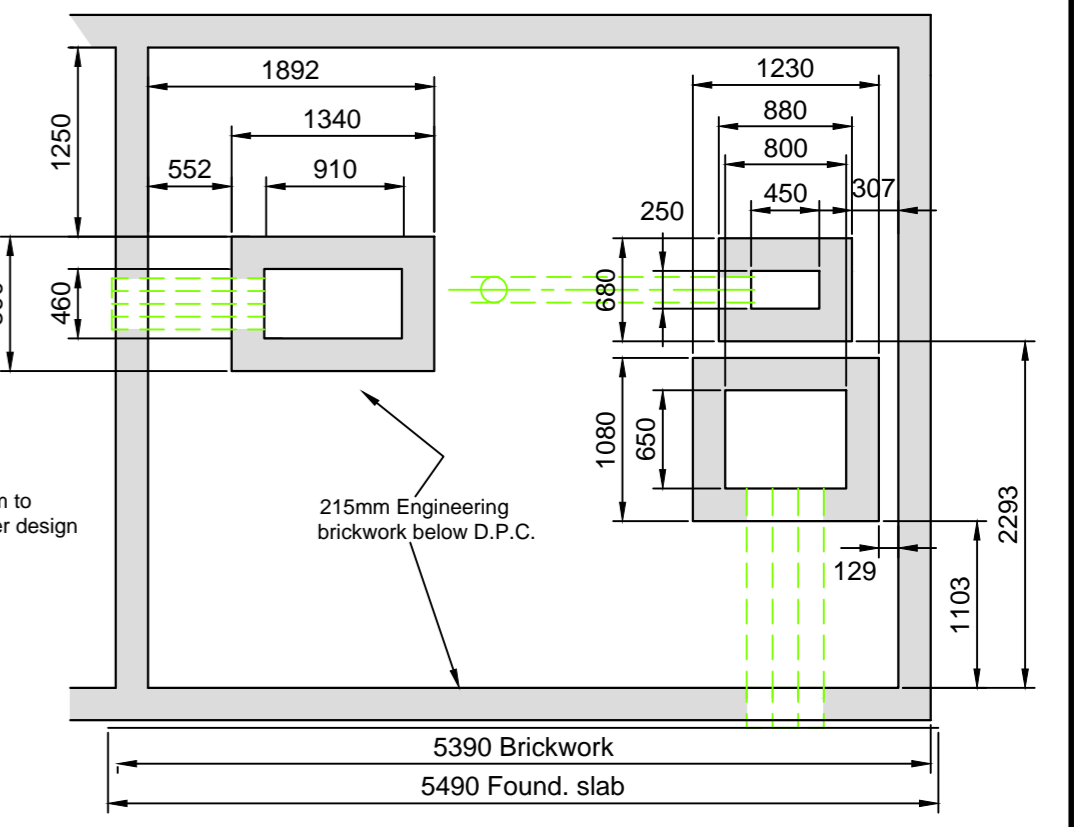


SECTION B-B

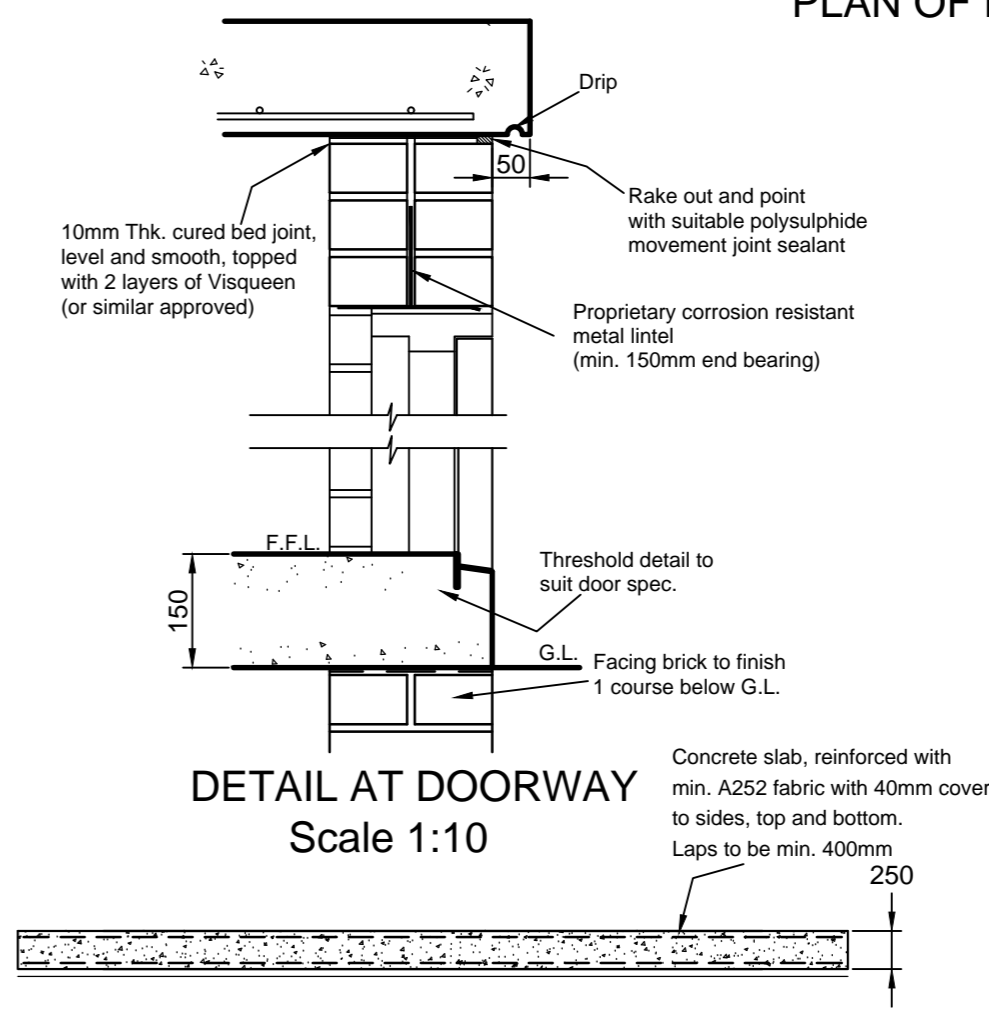


ROOF SECTION

ROOF PLAN

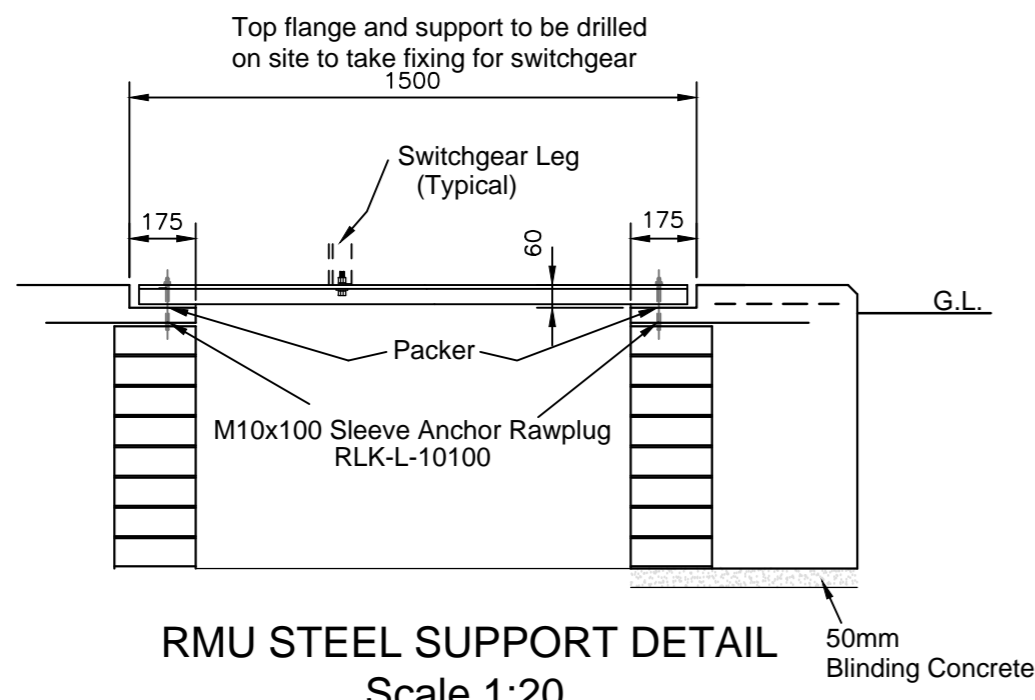


PLAN OF BRICKWORK BELOW FLOOR SLAB

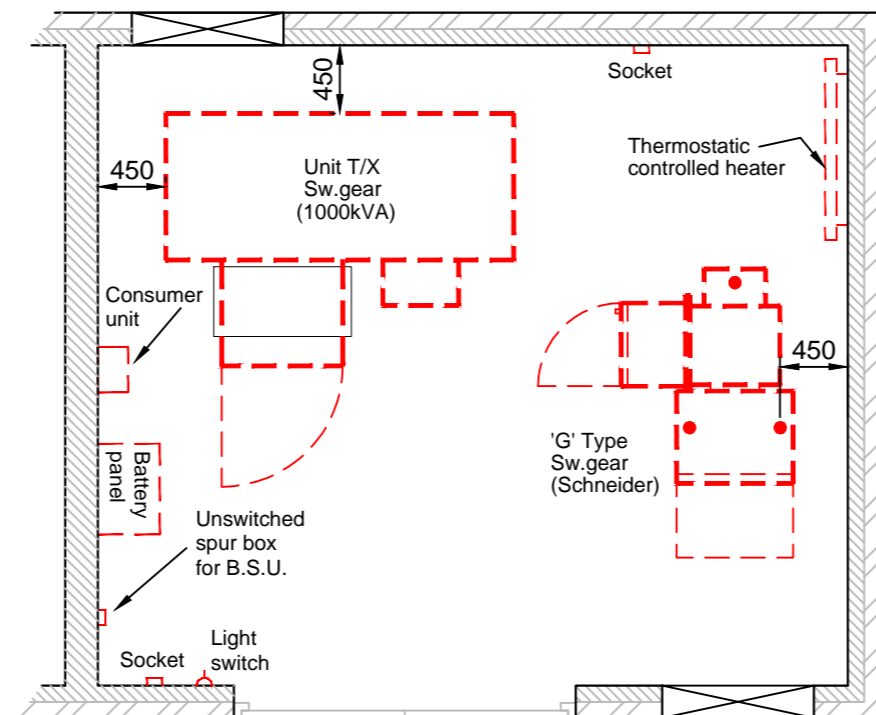


DETAIL AT DOORWAY Scale 1:10

FOUNDATION SECTION



RMU STEEL SUPPORT DETAIL Scale 1:20



PLANT LAYOUT

Electrical installation to comply with SPEN document SUB-03-029

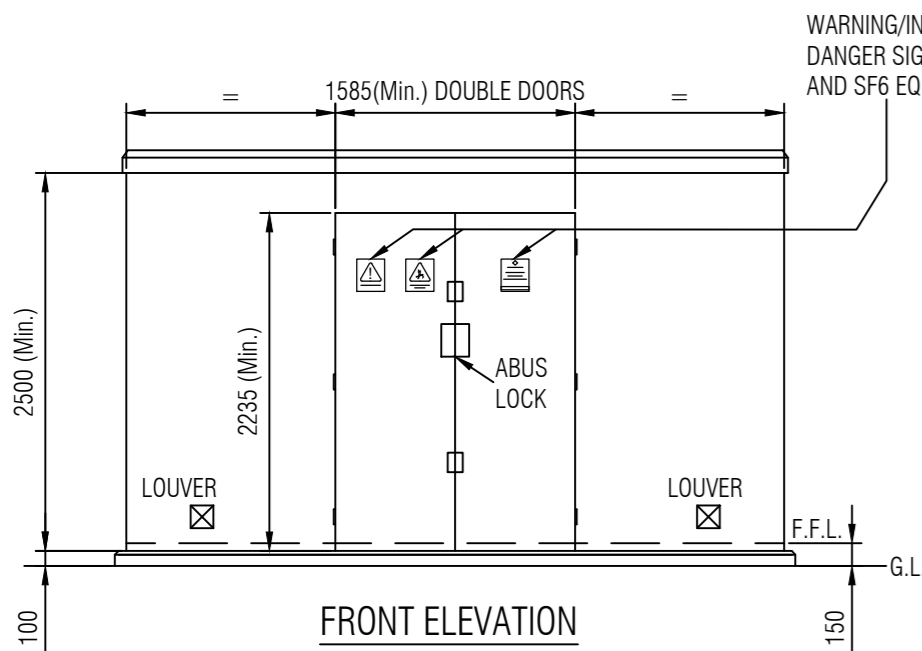
Rev. 3.0	Date 27/11/17	GENERAL UPDATES TO REFLECT CHANGES TO CIVIL POLICY DOCUMENTS AND AMENDMENTS
Drawn C.B.	Checked G.R.	Approved G.R.
TO SWITCHGEAR ARRANGEMENT		



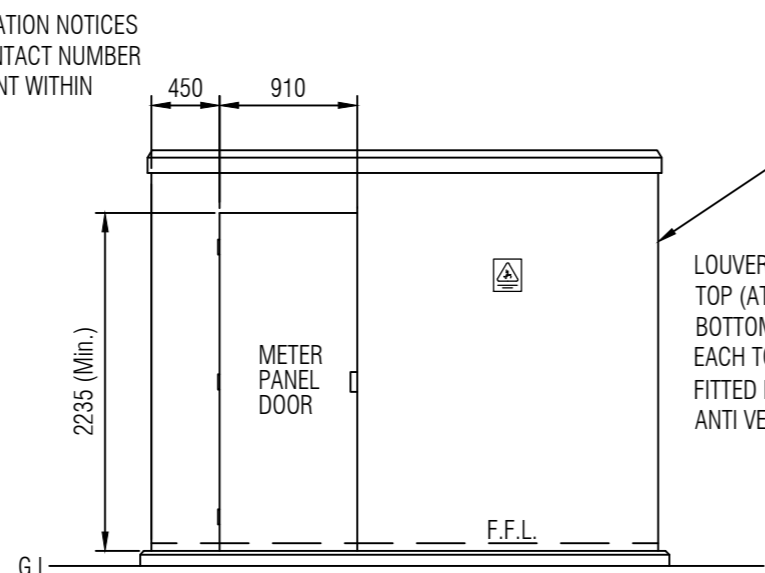
SP PowerSystems Ltd
System Design, Drawing Office, Gateway House,
Old Hall Road, Bromborough, CH62 3NX.
Telephone 0141 614 7143.

Title
TYPICAL TRADITIONAL BUILDING DETAIL FOR 11kV BRICK BUILT SUBSTATION (LV GENERATION)

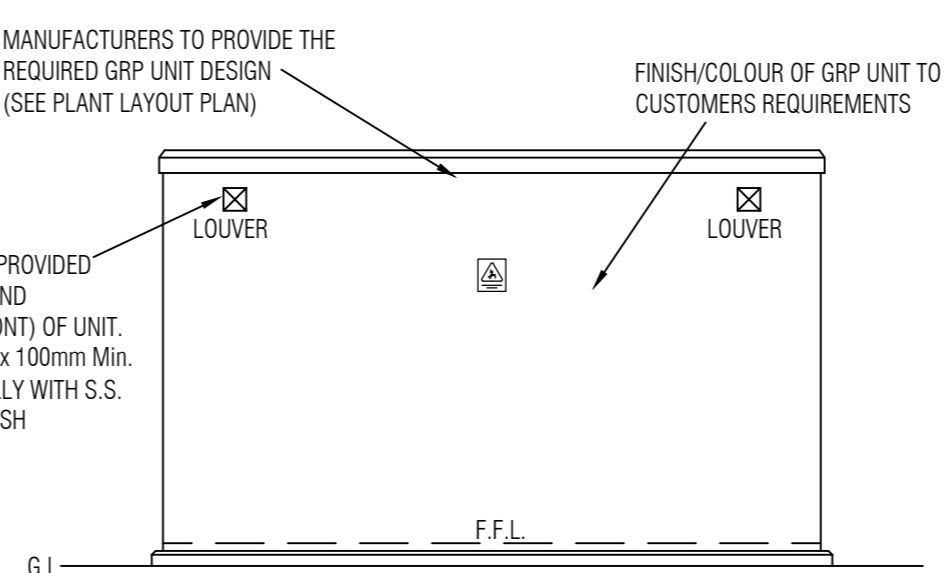
Location 11kV SUBSTATIONS					
Drawn	Date	Checked	Date	Approved	Date
M.T.	SEPT. 13	S.H.	OCT.13	A.J.R.	OCT.13
Status	Drg. No.		Rev.		
ISSUED	SP4105959		3.0		
© Copyright property of SP PowerSystems Ltd.					Scale 1:50
					Size A2



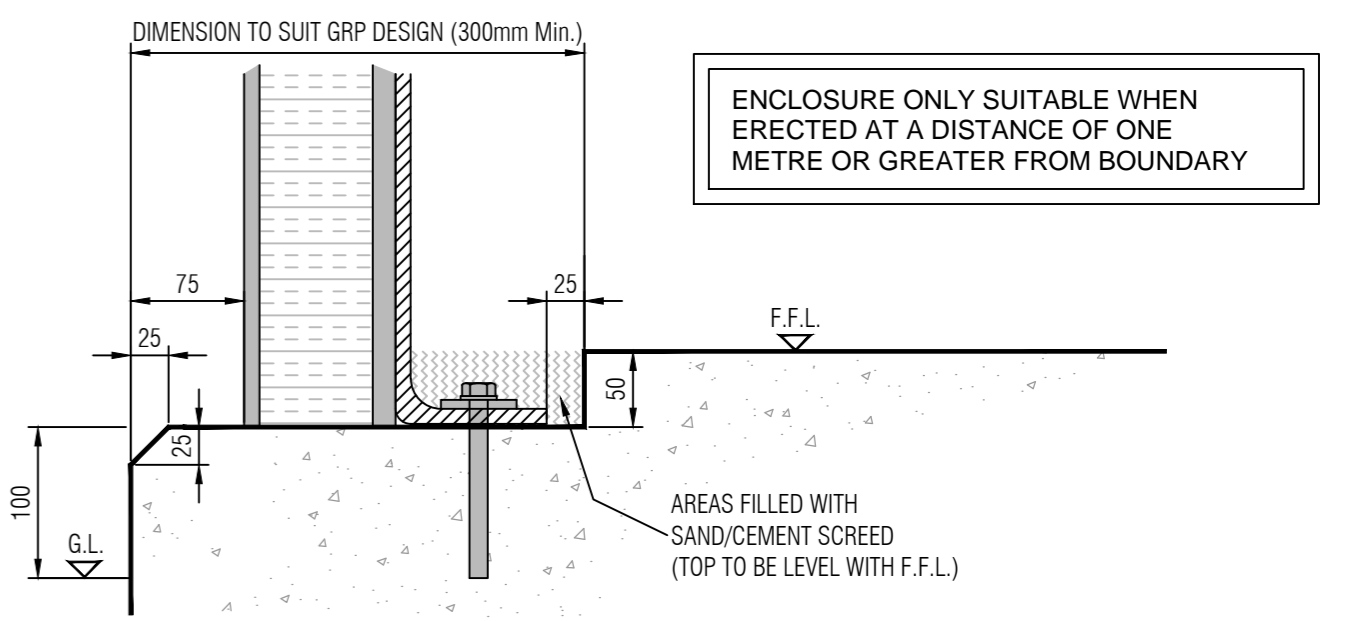
FRONT ELEVATION



SIDE ELEVATION

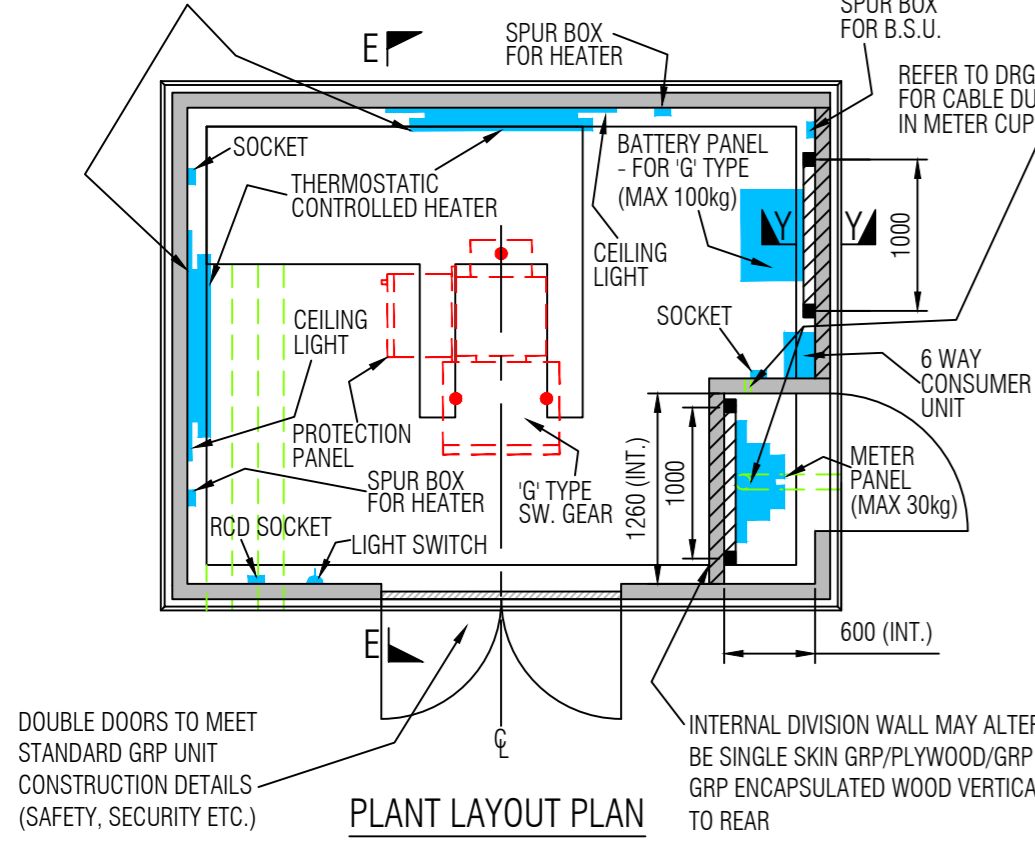


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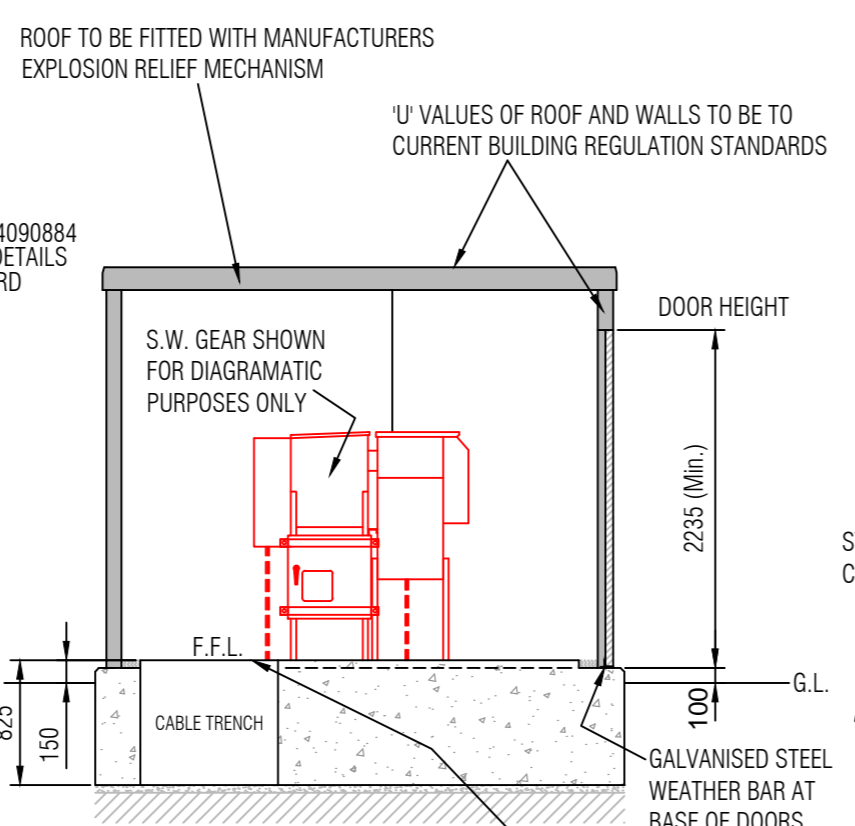


TYPICAL HOLDING DOWN DETAIL SECTION
(SCALE 1:5)

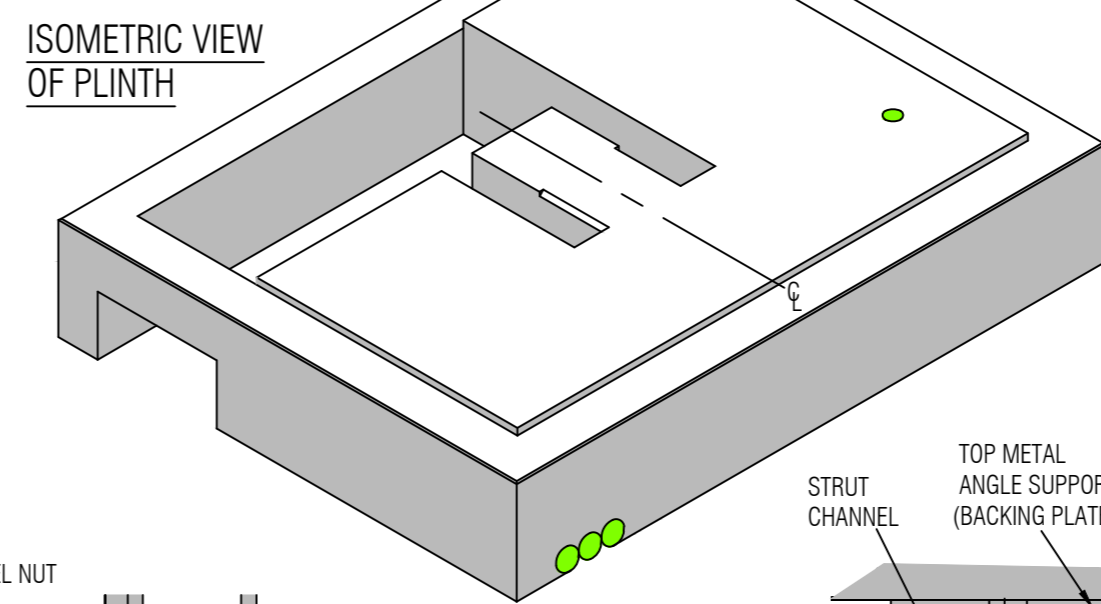
ALL ITEMS SHOWN BLUE ARE TO BE FITTED ON THE INTERNAL WALLS OF THE GRP AND MANUFACTURERS ARE TO INCLUDE THE FIXING, REINFORCEMENT, 'U' VALUE REQUIREMENTS ETC. IN THE GRP DESIGN. HEATERS/LIGHTS/SOCKETS ETC. CAN BE FIXED TO 18mm WEATHERPROOF PLYWOOD. BATTERY/METER PANELS TO HAVE A METALWORK FRAME BUILT FLOOR TO CEILING IN A BOX SECTION TO SUPPORT LOAD REQUIREMENT UP TO 100KG



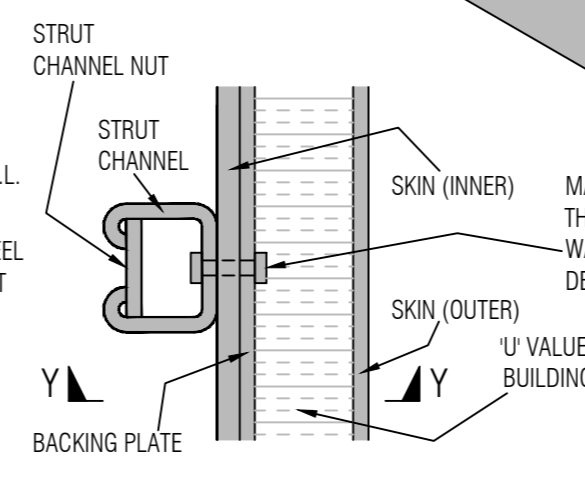
PLANT LAYOUT PLAN



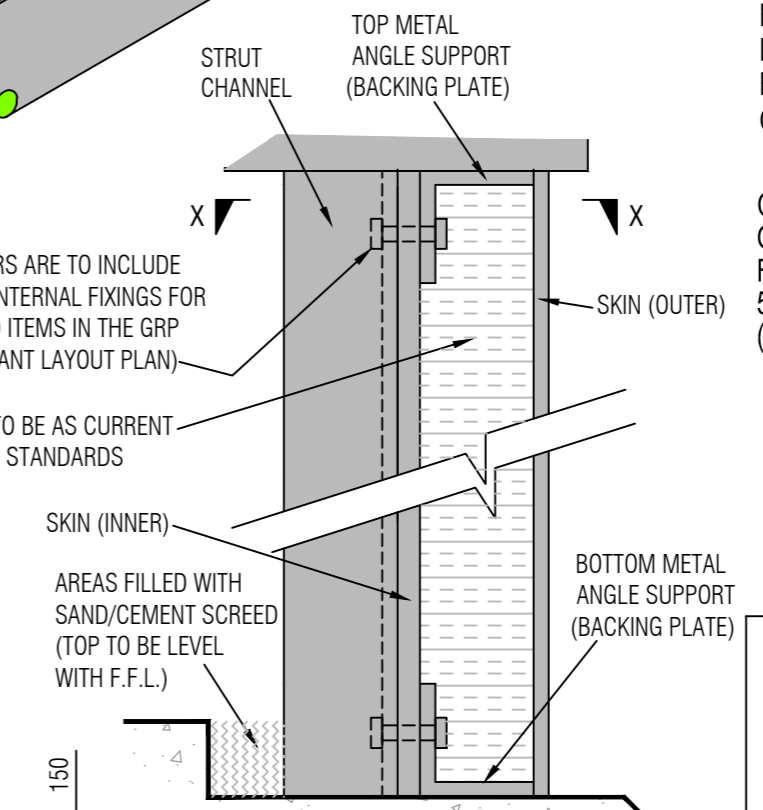
S.W. GEAR SECTION E - E



ISOMETRIC VIEW OF PLINTH



SECTION X-X (SCALE 1:5)



SECTION Y-Y (SCALE 1:5)

NOTES

CONCRETE
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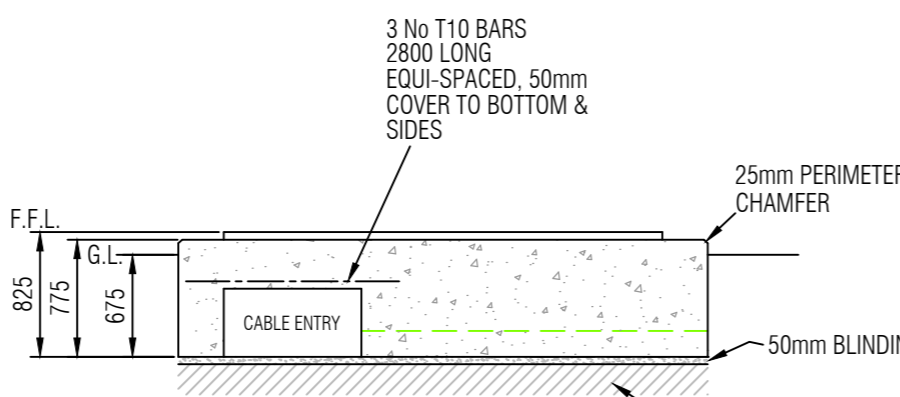
PLINTH (CONCRETE 40N/mm² 28 DAY CUBE STRENGTH)
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CABLE TRENCH AND SLOTS
ON COMPLETION OF CABLING, CABLE TRENCH AND SLOTS TO BE FILLED WITH DRY SAND, TRENCH TOPPED WITH A MINIMUM 50mm DEPTH OF SAND/CEMENT SCREED OVER VISQUEEN MEMBRANE. (TOP TO BE LEVEL WITH F.F.L.).

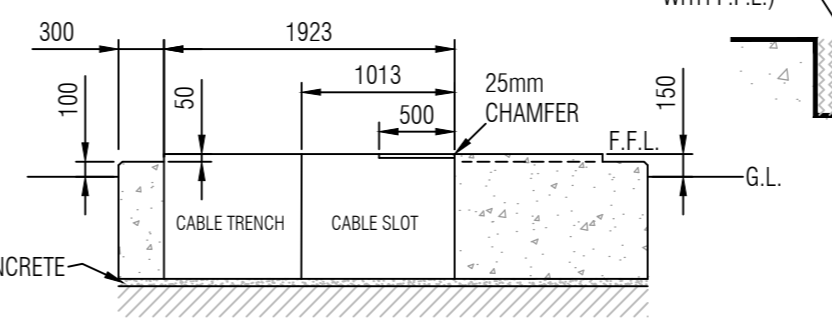
REQUIRED CABLE SLOT DIMENSIONS	
SCHNEIDER RN2/6c	LUCY VRN 2a/6a
'X' = 1316mm	'X' = 1238mm
'Y' = 700mm	'Y' = 778mm

THIS DRAWING TO BE READ IN CONJUNCTION WITH SUB-03-017 'GENERAL SPECIFICATION FOR THE CIVIL ENGINEERING AND BUILDING DESIGN AND CONSTRUCTION OF SECONDARY SUBSTATIONS'

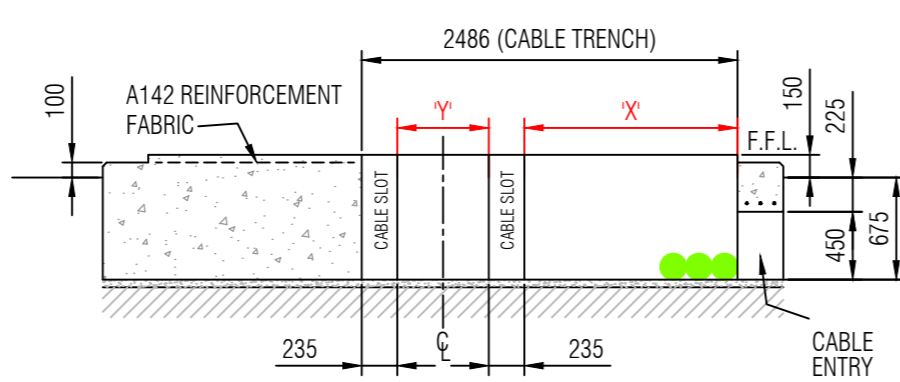
THIS DRAWING IS FOR GUIDANCE ONLY. PROPOSED SUBSTATION DETAILS ARE TO BE SUBMITTED FOR ACCEPTANCE BEFORE INSTALLATION.



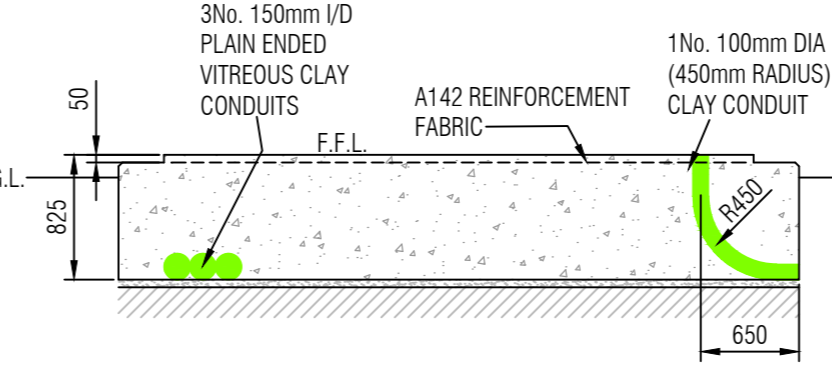
SECTION A - A



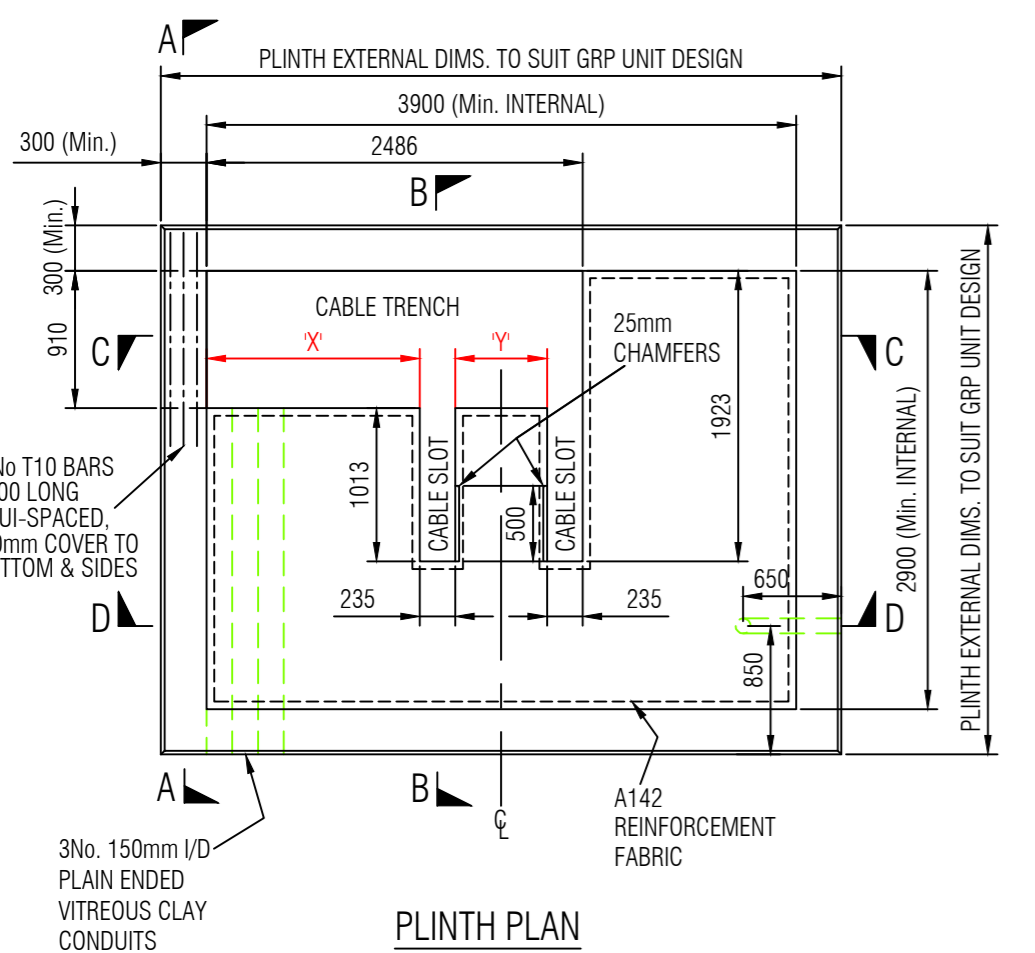
SECTION B - B



SECTION C - C



SECTION D - D

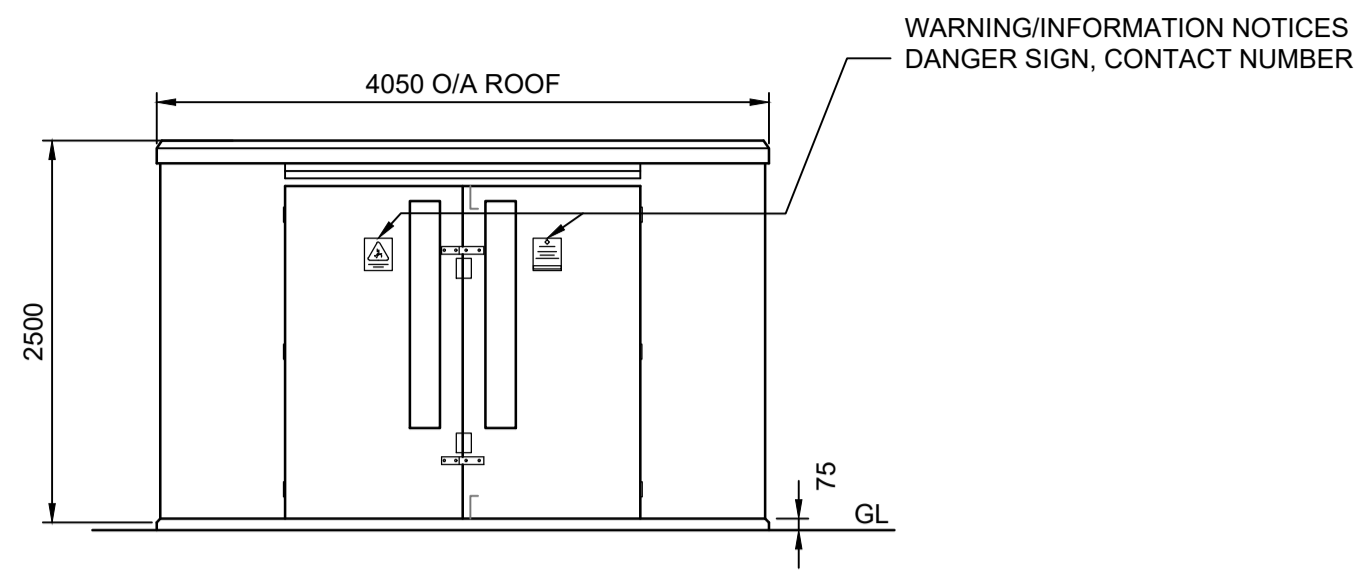


PLINTH PLAN

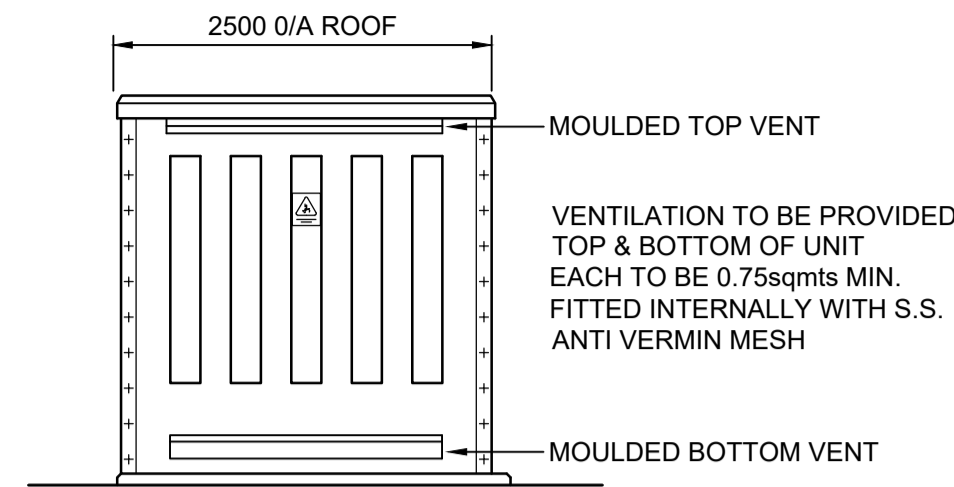
Rev	Date	Drawn	Reviewed	Approved	Description of Change
2	27/11/2017	CB	GR	GR	GENERAL UPDATES TO REFLECT CHANGES TO CIVILS POLICY DOCUMENT
1	17/12/2015	M.T.	S.H.	G.W.	-

		Drawing State: Approved		Project:	
		Approval Status: For Issue		Location: GUIDANCE DRAWING Voltage: 11kV	
				Drg. Title: TYPICAL TRADITIONAL BUILDING DETAILS FOR 11kV GRP PLINTH 'D' OR 'G' TYPE RMU (INDOOR KIT)	
				Drg. No.: SP4132847	
				Sheet: 2 Rev: 2 Next: Scale: 1:50 Size: A2	

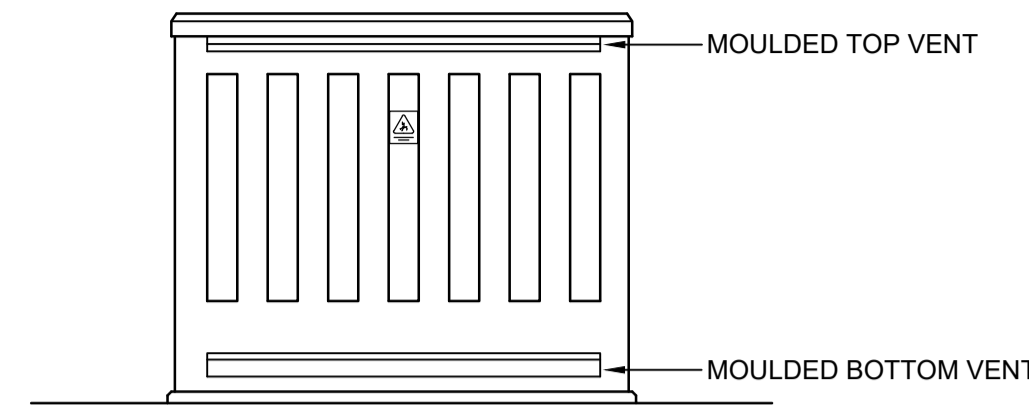
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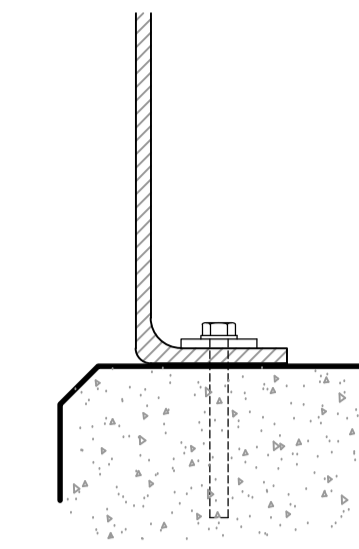
FRONT ELEVATION



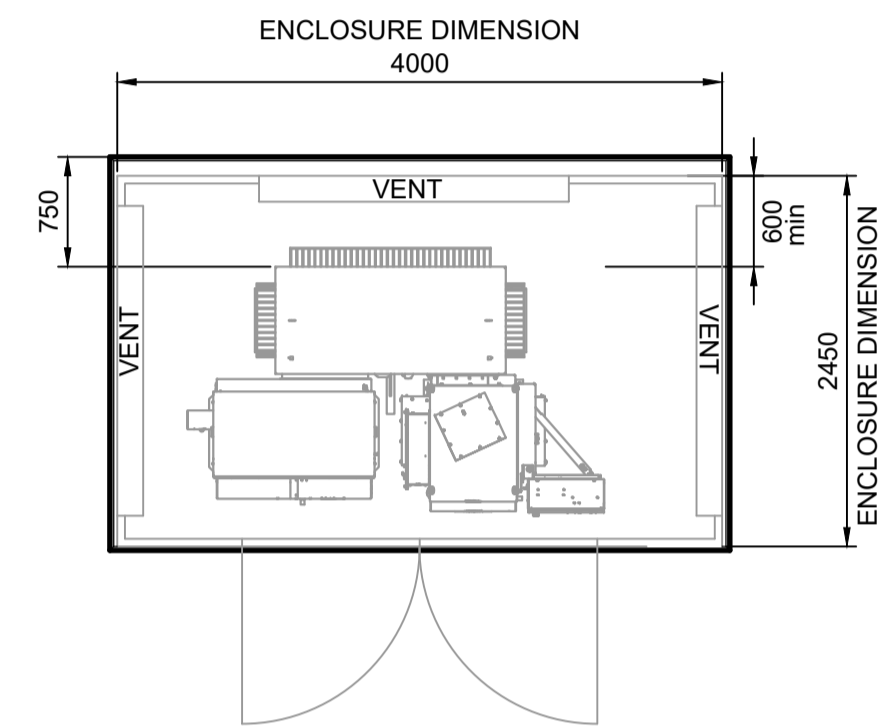
SIDE ELEVATION
OPPOSITE SIDE IDENTICAL



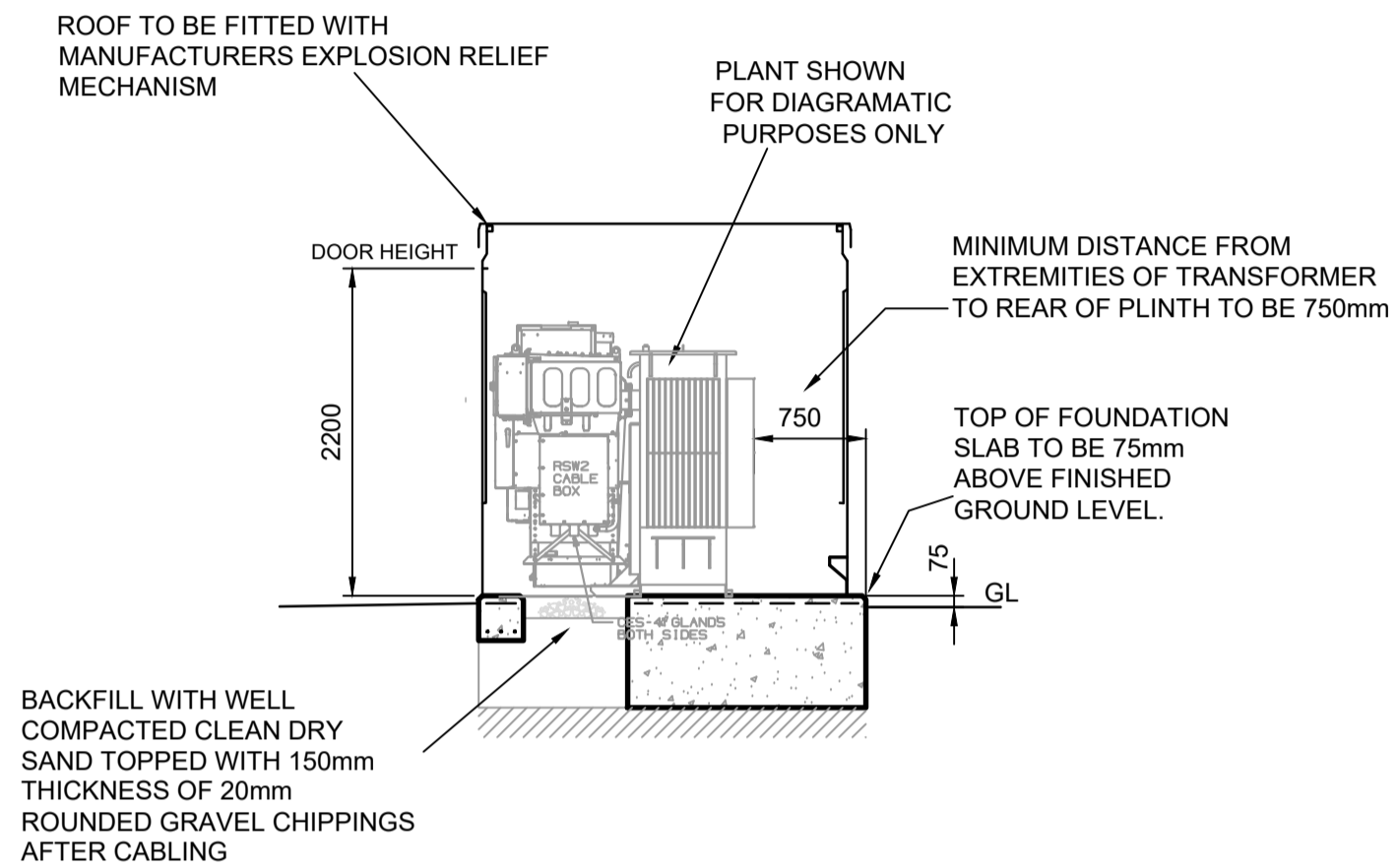
REAR ELEVATION



TYPICAL HOLDING DOWN DETAIL

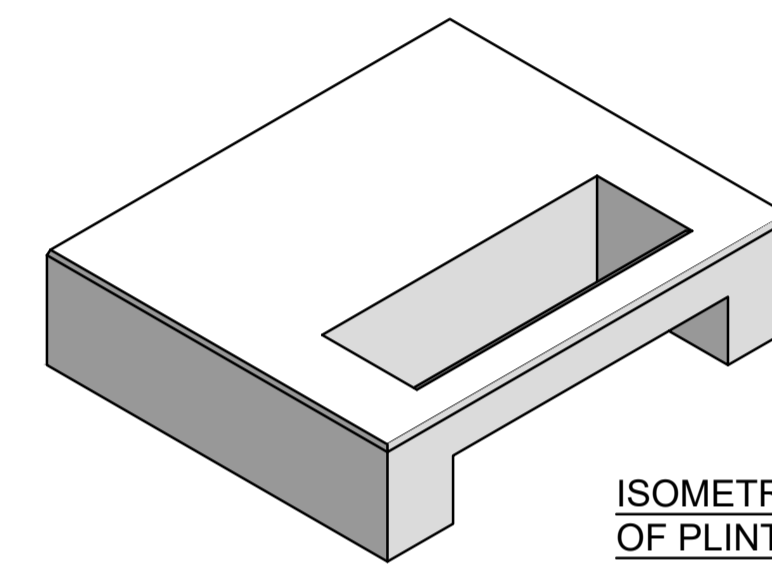


PLANT LAYOUT PLAN



PLANT SECTION

ENCLOSURE ONLY SUITABLE WHEN
ERECTED AT A DISTANCE OF ONE
METRE OR GREATER FROM BOUNDARY



ISOMETRIC VIEW
OF PLINTH

NOTES

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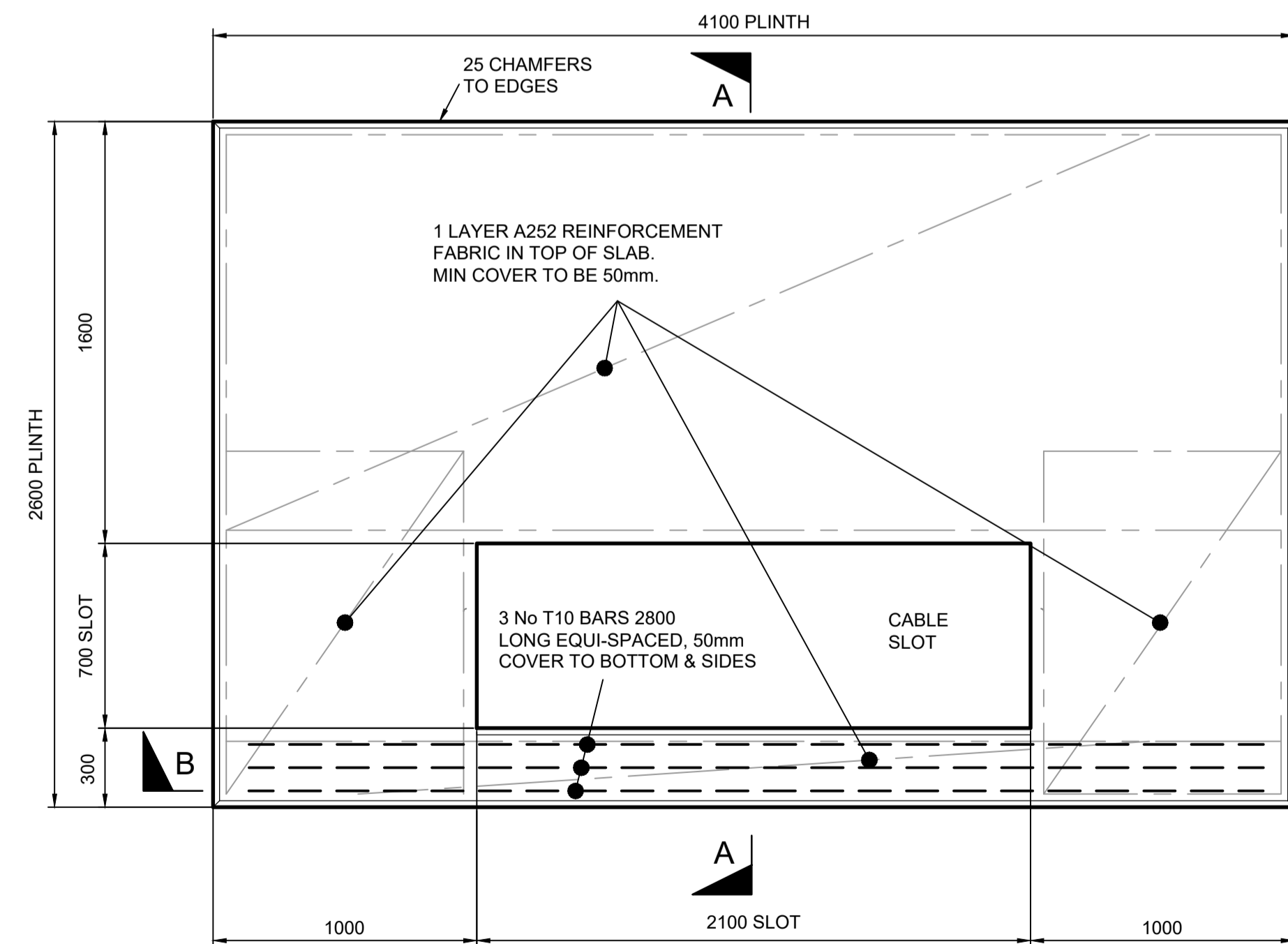
EARTHWORKS
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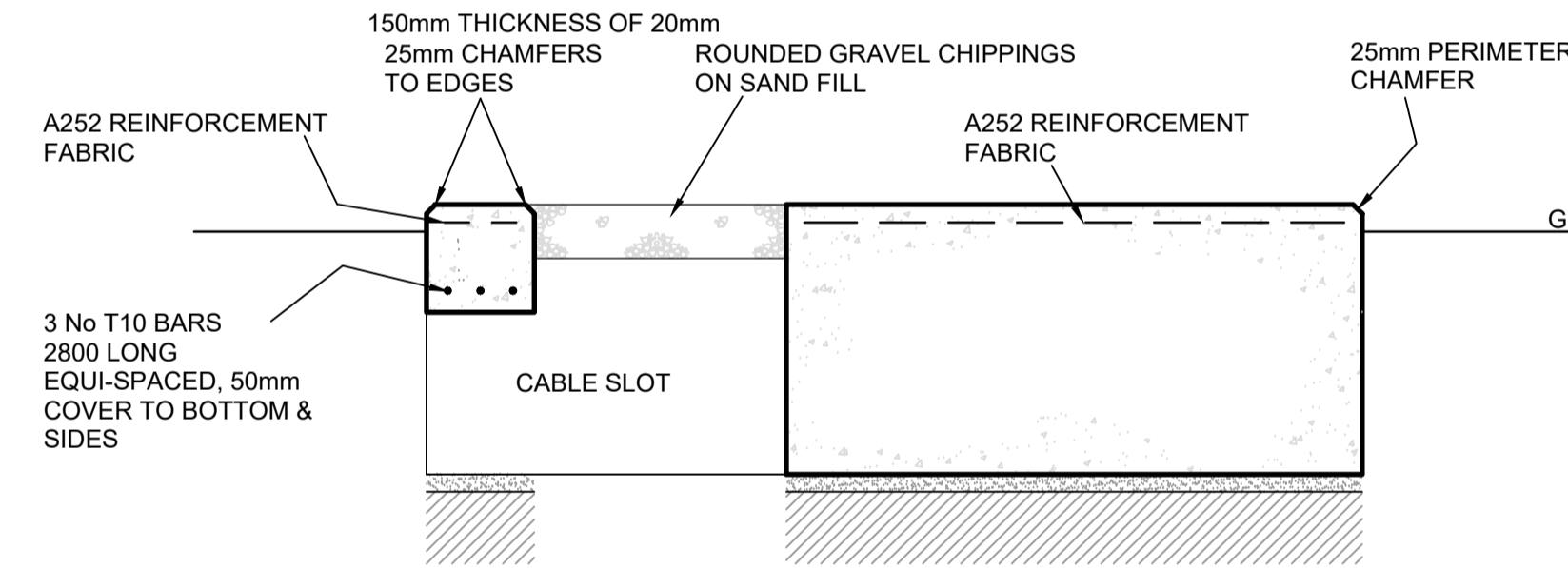
CABLE SLOT
ON COMPLETION OF CABLING, CABLE AREA TO BE FILLED WITH DRY SAND AND TOPPED WITH 150mm DEPTH OF 20mm ROUNDED GRAVEL CHIPPINGS

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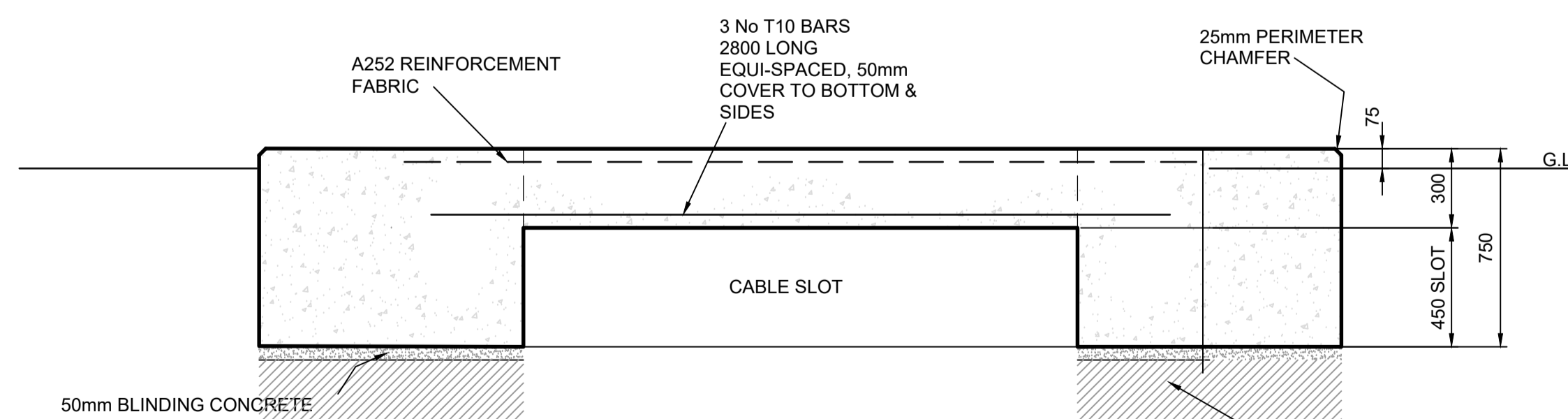
THIS DRAWING TO BE READ IN CONJUNCTION WITH
SUB-03-017 'GENERAL SPECIFICATION FOR THE
CIVIL ENGINEERING AND BUILDING DESIGN AND
CONSTRUCTION OF SECONDARY SUBSTATIONS'



FOUNDATION PLAN
SCALE 1:20



SECTION A - A
SCALE 1:20



SECTION B - B
SCALE 1:20

ADDITIONAL FOUNDATION AND/OR
GROUND IMPROVEMENT WORKS
TO CONSTRUCTOR'S DESIGN
TO SUIT SITE-SPECIFIC CONDITIONS

1	05/12/2023	K.P	G.R	G.R	ISSUED
Rev	Date	Drawn	Reviewed	Approved	Description of Change
					Approved For Issue
Project:					Voltage:
Location:					Drg. Title:
TYPICAL FOUNDATION PLINTH FOR 11kV UNIT SUBSTATION WITH 4.0 X 2.45 GRP ENCLOSURE					Drg. No.:
Drawn: K.P Rev'd: G.R App'd: G.R					Sheet: 1 Next: 1 Scale: 1:50 Size: A1
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