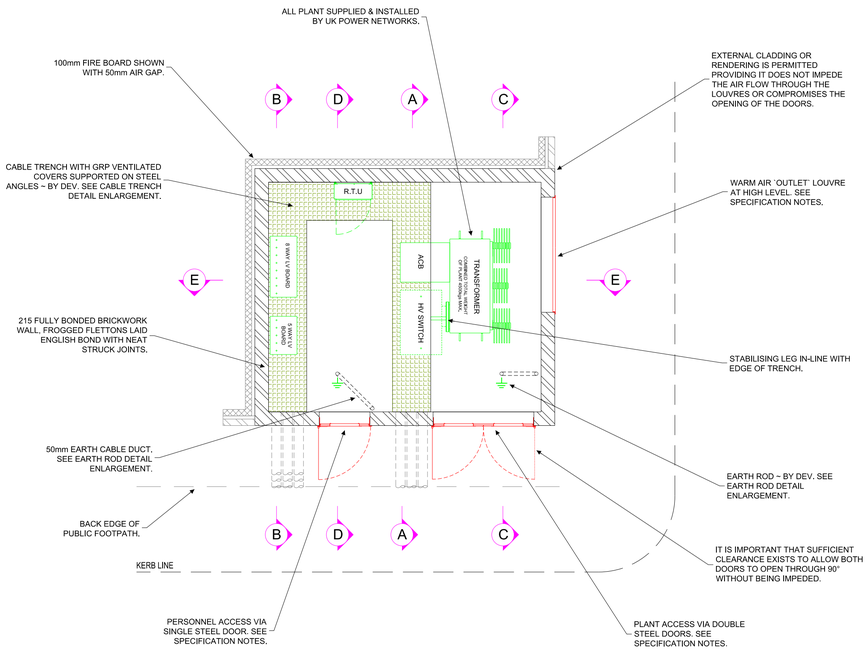
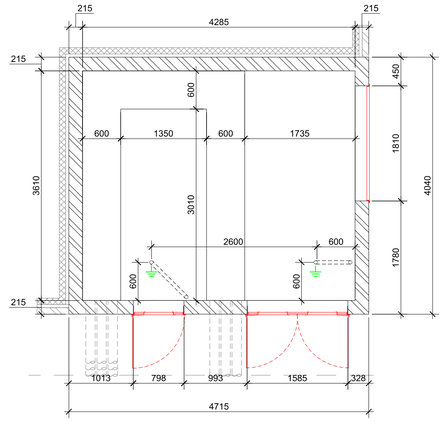


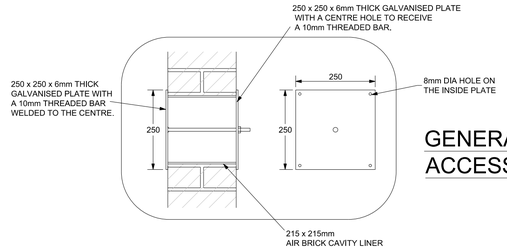
SUBSTATION ~ GENERAL ARRANGEMENT PLAN



SETTING OUT DIMENSIONS

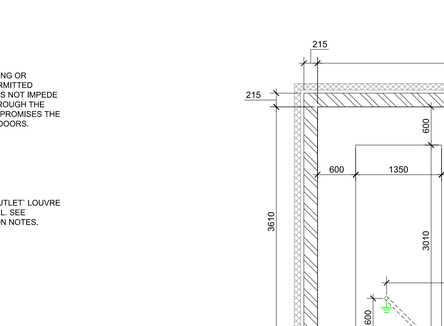
PROPOSED SUBSTATION LOCATION TO BE ADVISED BY DEVELOPER AND AGREED WITH UK POWER NETWORKS PRIOR TO CONSTRUCTION

LOCATION PLAN

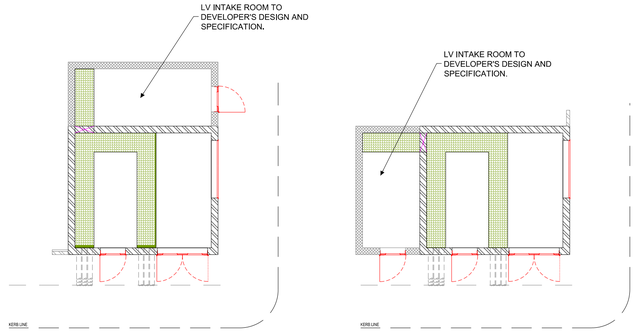


GENERATOR CABLE ACCESS DETAILS

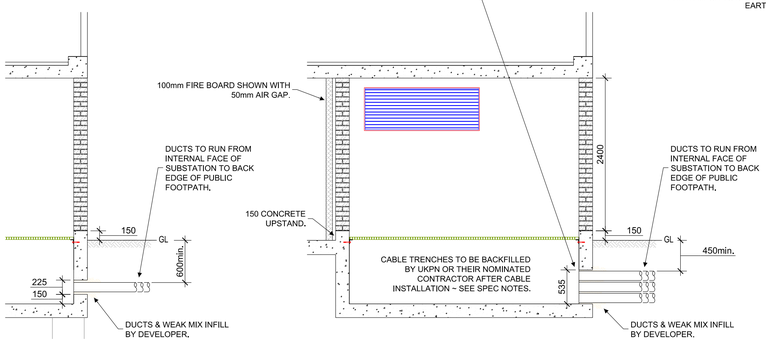
CABLE TRENCH DETAIL



EARTH ROD DETAIL

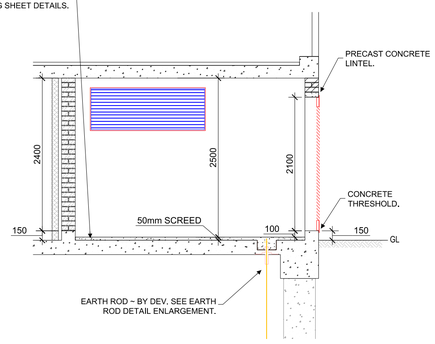


ALTERNATIVE SERVICE INTAKE POSITIONS

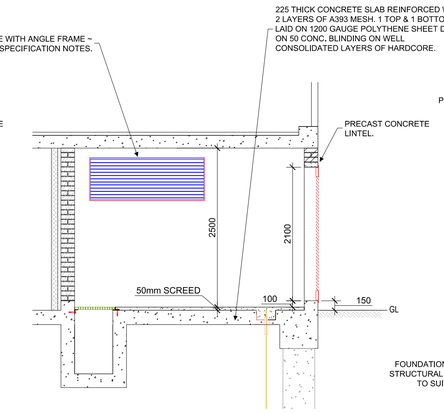


SECTION PART A~A

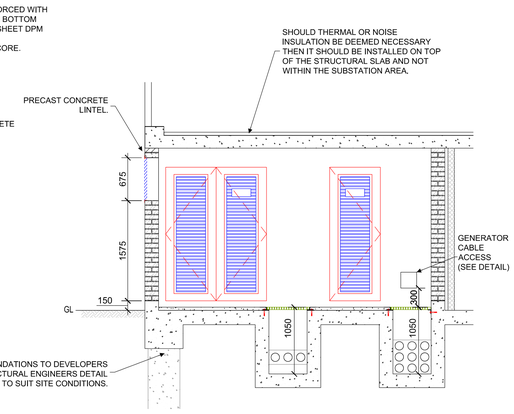
SECTION B~B



SECTION C~C



SECTION D~D



SECTION E~E

SPECIFICATION NOTES:

GENERAL NOTES
- THIS DRAWING IS NOT TO BE SCALED AND NO VARIATION TO THE STATED DIMENSIONS OR MATERIALS SPECIFIED WILL BE PERMITTED WITHOUT PRIOR WRITTEN CONSENT FROM UK POWER NETWORKS.
- ALL DIMENSIONS ARE IN MILLIMETRES.
- THE RUNNING OF HEATING, GAS, TELECOMS, WATER AND OTHER SERVICES THROUGH OR UNDER THE SUBSTATION AREA WILL BE NOT PERMITTED.
- THE DEVELOPER WILL BE RESPONSIBLE FOR OBTAINING ALL PLANNING CONSENTS AND BUILDING REGULATION APPROVALS BEFORE CONSTRUCTION WORK BEGINS.

SUBSTATION LOCATION
- IT IS IMPORTANT THAT THE POSITION AND ORIENTATION OF THE SUBSTATION IS DISCUSSED AND AGREED WITH THE UK POWER NETWORKS PRIOR TO THE COMMENCEMENT OF ANY BUILDING WORKS ON SITE.
- INTEGRAL SUBSTATIONS SHOULD ALWAYS BE INCORPORATED INTO THE CORNER OF A SITE IF POSSIBLE TO ALLOW VENTILATION TO FREE AIR ON TWO ELEVATIONS SO AS TO PROMOTE GOOD CROSS VENTILATION.
- SUBSTATIONS SHOULD BE LOCATED ADJACENT TO A PUBLIC HIGHWAY OR REACHED BY A PRIVATE DEDICATED ACCESS WAY WITH FULL CONTROL AND ASSOCIATED LEGAL RIGHTS.
- 24 HOUR UNIMPEDED UK POWER NETWORKS PERSONNEL ACCESS IS REQUIRED AT ALL TIMES, 365 DAYS OF THE YEAR. ANY DOORS OR GATES ON THE ACCESS ROUTE ARE TO BE LOCKED IN STANDARD UK POWER NETWORKS LOCKING SUITE.
- ACCESS VIA 24HR SECURITY IS UNACCEPTABLE.
- CONSIDERATION IS TO BE GIVEN AT THE DESIGN STAGE IF ADJACENT SOFT LANDSCAPING IS PROPOSED ~ PLANTING SCHEMES MUST ALLOW ADEQUATE PROVISION FOR FUTURE PLANT GROWTH WITHOUT COMPROMISING ACCESS OR VENTILATION THROUGH DOORS AND LOUVRES.

FOUNDATIONS, CONCRETE & REINFORCEMENT
- TO DEVS STRUCTURAL ENGINEER DETAIL TO SUSTAIN THE PLANT LOADINGS SHOWN.

FLOOR SLAB
- 50mm TOPPING SCREED WITH A MINIMUM COMPRESSIVE STRENGTH OF 40N/mm² AFTER 28 DAYS. CONCRETE WORKS FINISHED WITH A STEEL FLOAT TO WITHIN ±2mm OVER 2000mm. EARTH MESH TO BE RUN WITHIN SCREED. SEE EARTHING SHEET DETAILS.~ NOTE THAT A HIGH STANDARD OF WORKMANSHIP IS REQUIRED.
- REINFORCEMENT TO STRUCTURAL ENGINEERS REQUIREMENTS, TO SUSTAIN WEIGHT OF PLANT (4500kgs max.) IN ANY POSITION.
- KERB SUPPORTS INSTALLED FOR GRATING. ~ SEE CABLE TRENCH DETAIL.

ROOF SLAB
- TO DEVS STRUCTURAL ENGINEER DETAIL.
- ALL REINFORCEMENT TO HAVE SUFFICIENT MINIMUM COVER TO REINFORCEMENT SO AS TO PROVIDE A 4 HR FIRE RATING. HOLLOW POT BEAMS, PRECAST PLANKS OR LIGHTWEIGHT CONCRETE ON METAL DECKING ARE NOT PERMITTED.
- NO SERVICES, DRAINAGE FROM ABOVE WILL BE PERMITTED TO PASS THROUGH THE SLAB AND INTO THE SUBSTATION AREA.

STRUCTURAL STEELWORK
- THE PRESENCE OF ANY STRUCTURAL STEELWORK WITHIN THE SUBSTATION IS TO BE ADVISED TO AND AGREED UPON BY UKPN.
- TO BE FIREPROOFED TO A 4 HR STANDARD BY ENCASING IN CONCRETE OR CLAD IN FIREPROOFING MATERIAL MEETING UKPN SPECIFICATIONS AS ADVISED IN EAS-07-0011.

WALLS
- TO BE CONSTRUCTED OF 215 FULLY BONDED BRICKWORK TO BS EN 771-1 LAID ENGLISH BOND, BRICKS TO BE FROGGED AND HAVE A MINIMUM COMPRESSIVE STRENGTH OF >20N/mm² (DURABILITY MN) WITH NEAT STRUCK JOINTS, WALLS TO PROVIDE FLUSH FINISH INTERNALLY. ENGINEERING BRICK IS NOT PERMITTED.

OR
- 2 SKINS OF BRICKWORK LAID STRETCHER BOND WITH E.M.L. HORIZONTAL BED JOINT REINFORCEMENT EVERY 3rd COURSE WITH NO CAVITY. INNER SKIN TO BE OF COMMON FLETTONS ~ EXTERNAL SKIN TO HARMONISE WITH ADJACENT BRICKWORK.

DOORS
- VENTADOOR STEEL LOUVRED DOORS BY SUNRAY ENGINEERING (01233 639 039) WITH POWDER COATED FINISH. STANDARD COLOUR GREEN 14-C-39.
  - ~ SINGLE DOOR (798 X 2100 S/O) AS PER SUNRAY DRAWING No. V-SL-006
  - ~ DOUBLE DOORS (1585 X 2100 S/O) AS PER SUNRAY DRAWING No. V-DL-005
- SINGLE DOOR FITTED WITH PANIC BAR, DOUBLE DOORS SECURED INTERNALLY WITH UKPN STANDARD PADLOCK, PADLOCK SUPPLIED FREE OF CHARGE BY UKPN.
- MASTIC POINTING TO FRAME SURROUNDS EXTERNALLY.

VENTILATION LOUVRES
- COLD AIR INLET VIA LOUVRED DOORS ON FRONTAGE WITH HOT AIR OUTLET VIA HIGH LEVEL LOUVRED PANEL TO REAR OF TRANSFORMER COOLING FINS SO AS TO PROMOTE NATURAL CROSS VENTILATION OF SUBSTATION.
- LOUVRES TO BE OF STEEL CONSTRUCTION IN ANGLE FRAME BY SUNRAY ENGINEERING WITH POWDER COATED FINISH. STANDARD COLOUR GREEN 14-C-39.
- MASTIC POINTING TO FRAME SURROUNDS EXTERNALLY.

DUCTS
- THE EXACT NUMBER OF DUCTS AND DUCT ENTRY POSITIONS ARE TO BE VERIFIED BY UK POWER NETWORKS TO SUIT THE PROJECT ~ 8 DUCT ENTRIES IS TYPICAL.
- 125mm INTERNAL DIAMETER TWIN WALLED HIGH DENSITY POLYETHYLENE DUCTING TO ESI 12-24 (BS EN 50086-2-4) LAID FLAT & LEVEL. eg. RIDGIDUCT.

FINISHES
- FLOOR TO RECEIVE 2 COATS OF GREY CONCRETE FLOOR PAINT.
- WALLS & CEILING TO RECEIVE 2 COATS OF WHITE EMULSION FOR DUST SEALING.
- DOORS & LOUVRES TO BE POWDER COATED, EXACT COLOUR TO BE DETERMINED.

EARTHING - SHEET 2 FOR FULL DETAILS **SMALL POWER -** SHEET 3 FOR FULL DETAILS.

INFILL TO CABLE TRENCHES
- AFTER CABLE INSTALLATION SEAL ALL CABLE DUCTS, FILL TRENCHES WITH SAND 100mm ABOVE HIGHEST DUCT AND FINISH LEVEL TO A MINIMUM OF 500mm BELOW THE TOP OF GRATING ~ GRATINGS TO BE LEFT IN POSITION. CUT AROUND GRP GRATING AS REQUIRED FOR CABLE PENETRATIONS ENSURING THEY CAN STILL BE REMOVED WITH CABLES IN-SITU.

PLANT INSTALLATION
- REMOVE LOWER DEMOUNTABLE STEEL DOOR THRESHOLD TO DOUBLE DOORS WHEN INSTALLING PLANT.
- USE ACOUSTIC MOUNTS BETWEEN PLANT AND FLOOR SLAB.

Version	Date	Description		
D	17-01-14	Re-design, re-drawn.	M Dunk	DG
			M Dunk	DG
C	29-05-12	Earthing references removed from Sht 1. Notes amended.	H Amare	RDH
			M Dunk	HA
B	22-10-10	.	PL	WM
			PL	GD
A	22-03-10	ORIGINAL	MD	GD
			PL	GD
			Checked	Drn.
			Approved	Designed

UK Power Networks

TITLE

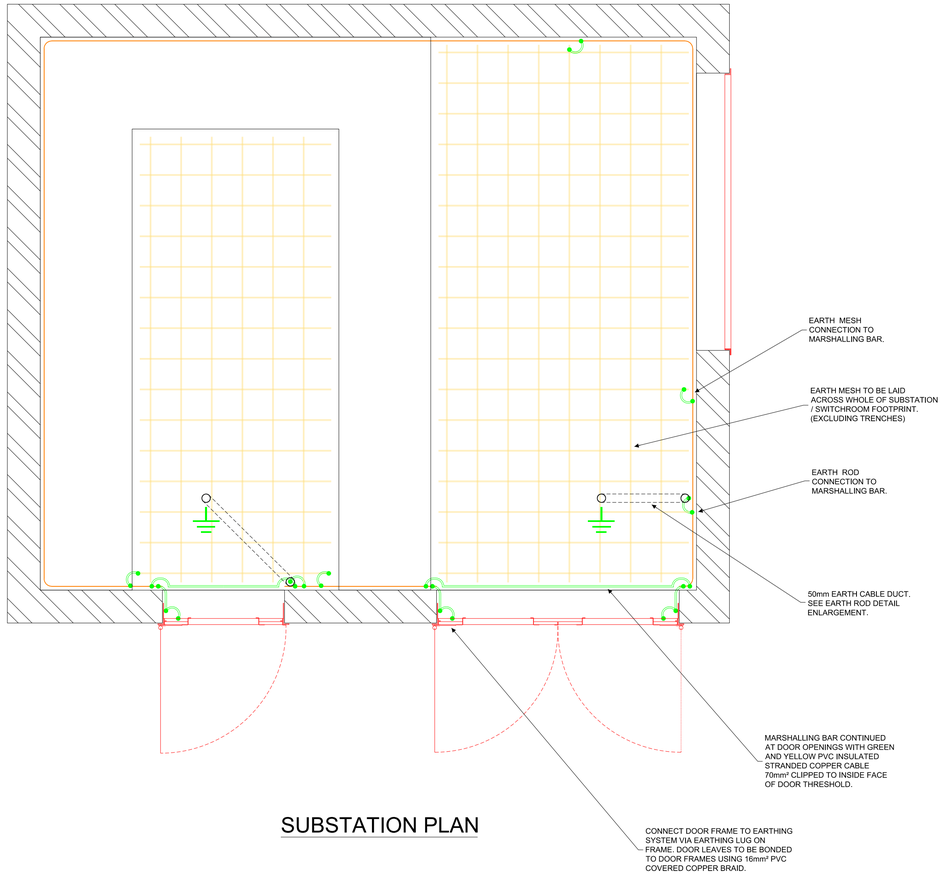
INTEGRAL SUBSTATION FOR SINGLE TRANSFORMER WITH ACB & LV BOARD

SCALE NTS @A1 APPROVED

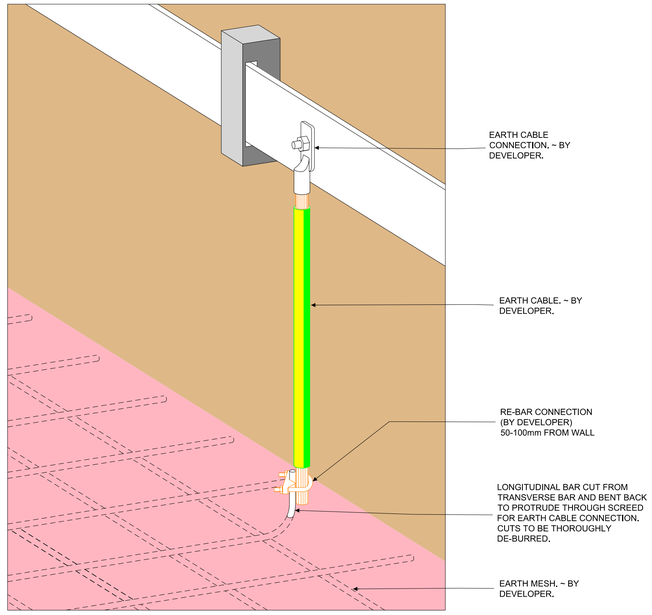
Version D

DRAWING NO. EDS 07-0102.08 SHEET 1 OF 3

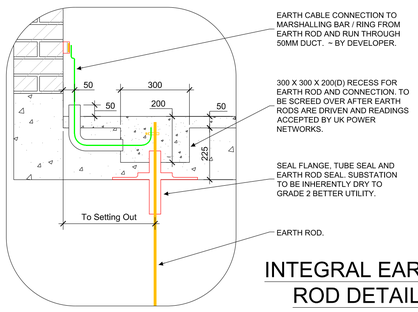
SITE SECONDARY SITES



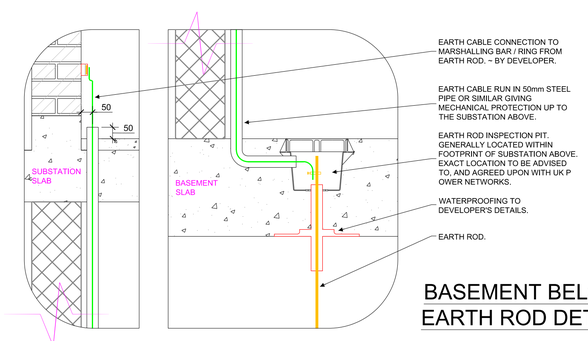
SUBSTATION PLAN



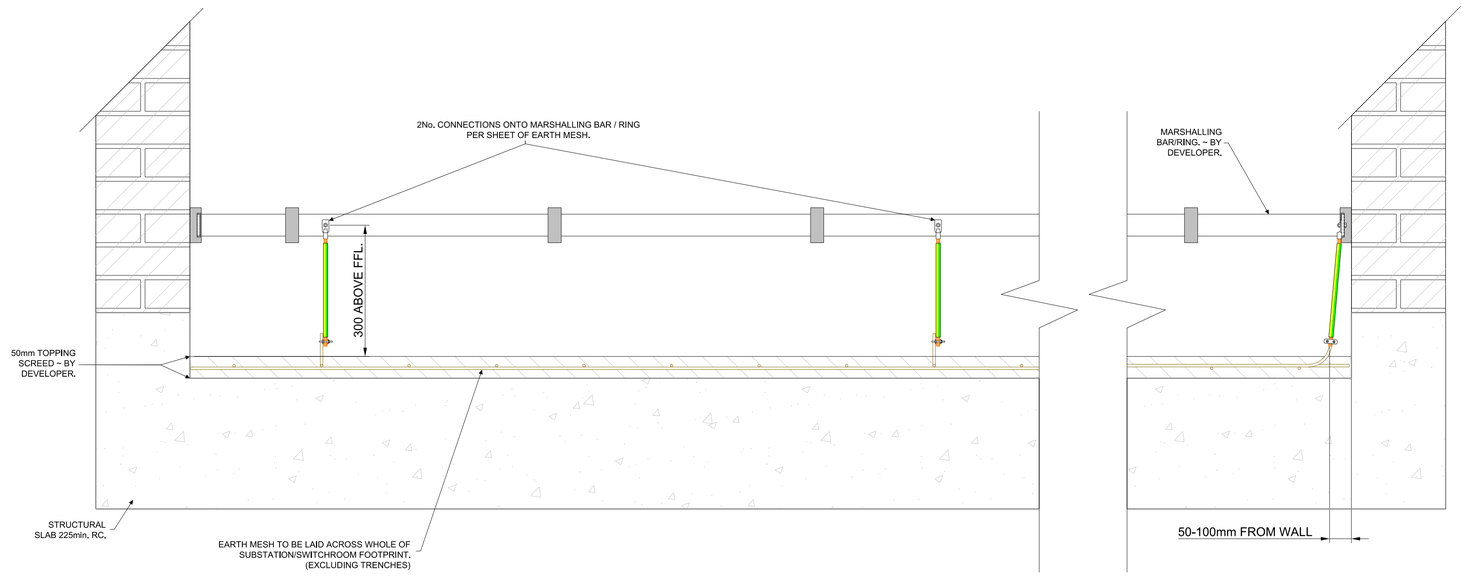
EARTH MESH CONNECTION DETAIL



INTEGRAL EARTH ROD DETAIL



BASEMENT BELOW EARTH ROD DETAIL



TYPICAL SECTIONS SHOWING EARTH MESH AND CONNECTIONS TO MARSHALLING BAR

GENERAL NOTES

THIS DRAWING SHALL NOT BE SCALED AND NO VARIATION TO THE STATED DIMENSIONS OR MATERIALS SPECIFIED SHALL BE PERMITTED WITHOUT PRIOR WRITTEN CONSENT FROM UK POWER NETWORKS.

ALL DIMENSIONS ARE IN MILLIMETRES.

THE EARTHING SYSTEM SHALL BE PROVIDED BY THE DEVELOPER/CONTRACTOR UNLESS STATED OTHERWISE BY UK POWER NETWORKS.

WHEREVER POSSIBLE THE EARTHING SYSTEM SHOULD BE INSTALLED IN ASSOCIATION WITH THE GROUND WORKS TO ENSURE THAT EARTH ELECTRODES ARE CORRECTLY POSITIONED PRIOR TO PLACEMENT OF CONCRETE.

EARTH MESH DESIGN

THE EARTHING DESIGN SHOULD INCLUDE A MESH LAID WITHIN A TOPPING SCREED TO CONTROL THE TOUCH VOLTAGE AROUND THE EQUIPMENT.

EARTH MESH TO BE INDEPENDENT OF THE OVERALL BUILDING REINFORCEMENT, LAYING IT WITHIN A TOPPING SCREED ACHIEVES THIS.

EARTH MESH TO BE LAID ACROSS THE WHOLE OF THE SUBSTATION / SWITCHROOM FOOTPRINT, (EXCLUDING TRENCHES); SIZE AND NUMBER OF SHEETS TO THE DEVELOPER'S / BUILDER'S DIRECTION.

2 NO. CONNECTIONS FROM EACH SHEET TO BE MADE DIRECTLY TO THE MARSHALLING BAR / RING AS SHOWN.

EARTH MESH SPECIFICATION

STEEL FABRIC REINFORCEMENT SQUARE MESH TO BS 4483.
A393, A252, A193 AND A142 ARE ACCEPTABLE.

EARTH MESH/MARSHALLING BAR/RING CONNECTION

ROD TO CABLE CLAMP TO BS 7430 OR EXOTHERMIC WELD.
70mm² GREEN AND YELLOW PVC COVERED STRANDED COPPER CABLE.
COMPRESSION CRIMP CONNECTOR AND BOLTED ONTO MARSHALLING BAR/RING.

MARSHALLING BAR/RING

40mm x 6mm ALUMINIUM TAPE, 300mm ABOVE FFL, FIXED WITH 50mm x 6mm PLASTIC DC TAPE CLIPS AND RUN CONTINUOUSLY AROUND PERIMETER WALLS OF SUBSTATION/SWITCHROOM.

SCREED

50mm-100mm WITH A MINIMUM COMPRESSIVE STRENGTH OF 40N/mm² AFTER 28 DAYS. STEEL FLOAT FINISH TO ±2mm OVER 2000mm. NOTE: 50mm SUITS DEPTH OF TRENCH SUPPORT ANGLES IF PRESENT.

EARTH ELECTRODE

THE EARTH RODS SHALL BE COPPER CLAD WITH APPROPRIATE FITTINGS, DRIVEN TO A MINIMUM DEPTH OF 2.4m.

THE EARTH ELECTRODE SHALL BE AS FOLLOWS:
FOR EARTH FAULT LEVELS UP TO 8kA USE 70mm² BARE STRANDED HARD DRAWN COPPER CABLE OR 25mm x 3mm COPPER TAPE.
FOR EARTH FAULT LEVELS UP TO 12kA USE 120mm² OR 2 x 70mm² BARE STRANDED HARD DRAWN COPPER CABLE OR 25mm x 4mm COPPER TAPE.
FOR EARTH FAULT LEVELS UP TO 15kA USE 2 x 70mm² BARE STRANDED HARD DRAWN COPPER CABLE OR 25mm x 6mm COPPER TAPE.

EARTH RESISTANCE

THE MAXIMUM RESISTANCE OF THE STANDALONE EARTHING SYSTEM SHALL BE SPECIFIED BY THE UK POWER NETWORKS DESIGNER.

WHERE THE EARTHING SYSTEM IS INSTALLED BY A DEVELOPER OR CONTRACTOR CERTIFICATION CONFIRMING THE RESISTANCE OF THE STANDALONE EARTHING SYSTEM SHALL BE PROVIDED TO UK POWER NETWORKS PRIOR TO EQUIPMENT INSTALLATION.

BONDING

NOT ALL EQUIPMENT BONDING IS SHOWN ON THE DRAWING. ALL EQUIPMENT SHALL BE BONDED IN ACCORDANCE WITH ECS 06-0023.

OTHER

STEEL DOORS SHALL BE BONDED TO THE EARTHING SYSTEM AS FOLLOWS:
DOOR LEAVES TO DOOR FRAMES USING MINIMUM 16mm² COPPER BRAID.
DOOR FRAME SURROUND TO EARTHING SYSTEM VIA EARTHING LUG ON FRAME USING MINIMUM 16mm² PVC COVERED STRANDED COPPER CABLE.

A 6-WAY EARTH BAR SHALL BE PROVIDED IN THE POSITION SHOWN AT 300mm ABOVE SUBSTATION FFL.

FURTHER INFORMATION

REFER TO:
EDS 06-0014 SECONDARY SUBSTATION EARTHING DESIGN
EDS 06-0023 SECONDARY DISTRIBUTION NETWORK EARTHING CONSTRUCTION

NOTE: THIS DRAWING ONLY SHOWS THE EARTHING ASSOCIATED WITH THE GROUND WORKS. ADDITIONAL EARTHING MAY BE REQUIRED TO ACHIEVE THE EARTH RESISTANCE VALUE AND TO ENSURE THE SUBSTATION IS SAFE. REFER TO THE RELEVANT EARTHING STANDARD FOR THE COMPLETE EARTHING AND BONDING REQUIREMENTS.

EARTHING KEY

EARTH ROD

EARTH ELECTRODE

Version	Date	Description	Checked	Drn.
			Approved	Designed
E	13-05-14	Notes amended.	S Tucker	H Amare
D	20-03-14	Re-design, re-drawn.	S Tucker	H Amare
C	28-05-12	Revised earth connections and notes	S Tucker	DG/RDH
B	22-10-10	.	S Tucker	DG
A	22-03-10	ORIGINAL	ST	RDH
			PL	WM
			MD	GD
			PL	GD

UK Power Networks

TITLE

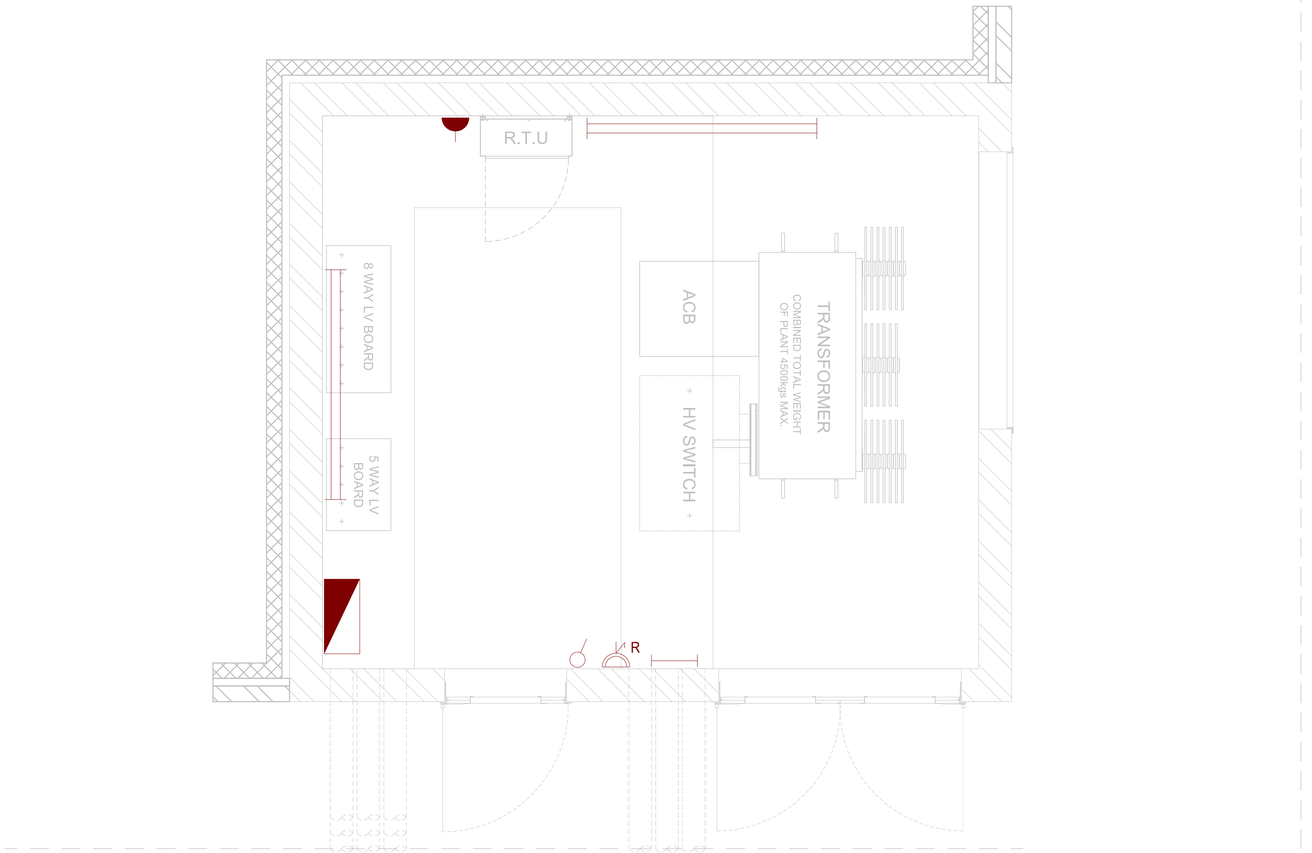
EARTHING ARRANGEMENT FOR INTEGRAL SUBSTATION FOR SINGLE TRANSFORMER WITH ACB & LV BOARD

SCALE NTS @A1 APPROVED

Version E

DRAWING NO. EDS 07-0102.08 SHEET 2 OF 3

SITE SECONDARY SITES



KEY:

WALL MOUNTED TWIN FLUORESCENT LIGHTING FITMENT WITH 58W TUBES MOUNTED 1800 ABOVE FFL

SQUARE BULKHEAD FITTING IP55 FLUORESCENT LIGHTING FITMENT WITH 2D 28W TUBE MOUNTED 1800mm ABOVE FFL

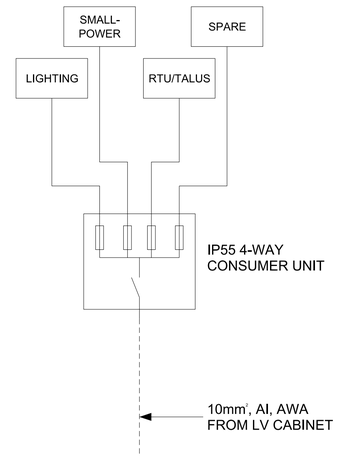
13A UNSWITCHED FUSED SPUR FOR RTU MOUNTED 1000mm ABOVE FFL

13A TWIN SWITCHED SOCKET IP55 WITH 30mA RCD WITH OPERATING TIME OF 30ms MOUNTED 400mm ABOVE FFL

LIGHT SWITCH MOUNTED 1000mm ABOVE FFL

60A SINGLE PHASE CONSUMER UNIT
- 63A DOUBLE POLE DISCONNECTOR (RTU)
- 32A MCB (SMALL POWER)
- 6A MCB (LIGHTING)
MOUNTED 1800mm ABOVE FFL

SCHEMATIC DIAGRAM



LIGHTING - 5A RCBO -
1 x IP55 BULKHEAD FITTING (LOW LEVEL) WITH INCANDESCENT TYPE LAMP TO SHOW LOW VOLTAGE.
2 x IP55 5ft FLUORESCENT FITTING.

SMALL POWER - 16A FUSED -
1 x DOUBLE IP55 RCD TYPE SOCKET OUTLET
1 x DOUBLE IP55 SOCKET OUTLET NON RCD WITH LABEL TO STATE "TEST SOCKET ONLY".

NOTES:

THE ELECTRICAL INSTALLATION SHALL BE INSTALLED AND TESTED TO THE CURRENT ISSUE OF BS 7671.

ALL WORKS TO BE UNDERTAKEN BY A CONTRACTOR WHO IS REGISTERED WITH THE NICEIC AND/OR ECA.

INTERNAL LIGHTING
· INTERNAL LIGHTING SHALL PROVIDE A MINIMUM LUMINESCENCE OF 500 LUX IN ACCORDANCE WITH HSE GUIDE HSG38 LIGHTING AT WORK.
· GENERAL PURPOSE LUMINAIRES SHALL BE OF A FLUORESCENT TYPE COMPLYING WITH BS 4533, 1500mm LONG WITH TWIN 58W TUBES AND HAVE A MINIMUM DEGREE OF PROTECTION OF IP55 IN ACCORDANCE WITH BS EN 60529.
· A 1 GANG, 1 WAY LIGHT SWITCH WITH SURFACE BACK BOX OR SURFACE MOUNTED PULL CORD SHALL BE POSITIONED IMMEDIATELY ADJACENT TO THE ACCESS INTO THE SUBSTATION BUILDING.

POWER CIRCUIT FITTINGS
· FITTINGS SHALL BE CORROSION RESISTANT METAL CLAD SURFACE UNITS. AS A MINIMUM 1 X 13A IP55 SWITCHED TWIN SOCKET SHALL BE PROVIDED. EACH SOCKET SHALL INCLUDE A RCD WITH A TRIPPING SENSITIVITY OF 30mA AND AN OPERATING TIME OF 30ms.

CONSUMER UNIT
· AN INSULATED SPLIT LOAD CONSUMER UNIT CONFORMING TO BS EN 60439-3 AND BS 5486-12 AND PROVIDING, AS A MINIMUM, 63A DOUBLE POLE DISCONNECTOR, A 32A MCB FOR THE POWER CIRCUIT AND A 6A MCB FOR THE LIGHTING CIRCUIT SHALL BE PROVIDED.
· THE CONSUMER UNIT IS TO BE FITTED ADJACENT TO A 100A FUSED CUT-OUT RECEIVING THE LIVE, NEUTRAL AND EARTH FEEDS.

CABLING
ALL CABLES SHALL HAVE STRANDED COPPER CONDUCTORS WITH A MINIMUM DIMENSIONS AS BELOW:
CUT OUT TO CONSUMER UNIT - 4mmØ
LIGHTING - 1.5mmØ
SMALL POWER - 2.5mmØ

TRUNKING AND CONDUITS
· ALL CABLES SHALL BE INSTALLED IN TRUNKING OR CONDUIT.
· TRUNKING AND ACCESSORIES SHALL COMPLY BS 4678 AND SHALL BE RIGID PVC SUITABLE FOR INDOOR USE, SELF EXTINGUISHING AND SHALL NOT PROPAGATE FLAMES.
· TRUNKING SHALL BE SUPPORTED AT INTERVALS OF NO MORE THAN 2m HORIZONTALLY AND 2.5m VERTICALLY AND SHALL BE ADEQUATELY SIZED FOR THE NUMBER OF CABLES INSTALLED.
· CONDUIT SHALL BE ROUND, HIGH IMPACT, NON FLAME PROPAGATING, SELF EXTINGUISHING, HEAVY DUTY PVC TO BS EN 50086.

Version	Date	Description		
A	18-09-13	ORIGINAL	M Dunk	R Hawkes
			M Dunk	H Amare
			Checked	Drn.
			Approved	Designed

UK Power Networks

TITLE
SMALL POWER & LIGHTING LAYOUT
INTEGRAL SUBSTATION
FOR SINGLE TRANSFORMER WITH ACB & LV BOARD

SCALE 1:20 @A1	Approved	Version
DRAWING NO. EDS 07-0102.08	SHEET 3 OF 3	A
SITE SECONDARY SITES		