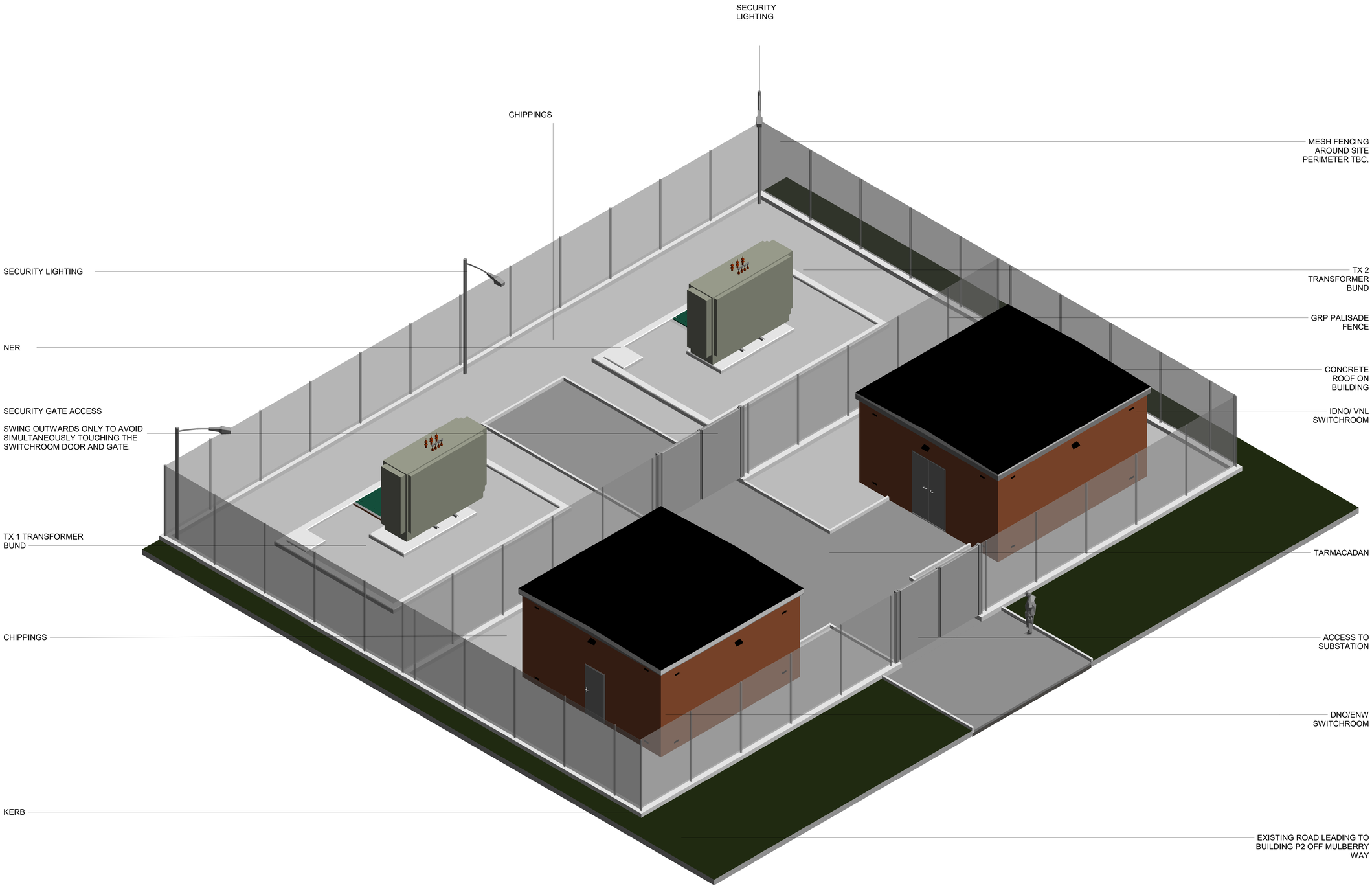
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3D AXONOMETRIC VIEW - SUBSTATION

0m 0.8m 1.6m 2.4m 3.2m 4m

REFER TO MANUFACTURERS DRAWINGS FOR SWITCHGEAR DETAILS
REFER TO ENGR. DRAWINGS FOR FOUNDATION & ROOF INFORMATION

01- GENERAL NOTES
SUBSTATION BUILDINGS SHALL BE FULLY WEATHERPROOF, PAYING PARTICULAR ATTENTION TO DESIGN AND CONSTRUCTION DETAILS WITH RESPECT TO WIND DRIVEN RAIN AND STORM WATER RUN-OFF.

SUBSTATION BUILDINGS SHALL BE DESIGNED AND DETAILED SUCH THAT THE POTENTIAL FOR VANDALISM AND THEFT IS MINIMISED.

WHERE EXPOSED METALWORK WITHIN IS ACCEPTABLE IN PRINCIPLE TO ENERGYNETWORKS THIS SHALL BE BONDED TO THE SUBSTATION EARTH SYSTEM WITH ADEQUATELY SIZED INSULATED CONDUCTOR.

SUFFICIENT SPACE SHALL BE PROVIDED WITHIN BUILDINGS TO FACILITATE ACCESS FOR ALL NECESSARY CONSTRUCTION, TESTING AND COMMISSIONING, INSPECTION, MAINTENANCE AND REMOVAL ACTIVITIES. THE ARRANGEMENT SHALL MAKE ALLOWANCE FOR FUTURE BAYS WHERE REQUIRED.

A CLEAR PASSAGE OF NOT LESS THAN 750MM WIDE SHALL BE PROVIDED BEHIND AND AROUND FLOOR-MOUNTED EQUIPMENT WHERE ACCESS FOR OPERATION, MAINTENANCE OR REPLACEMENT OF EQUIPMENT IS REQUIRED AND WHERE ACCESS FOR MAINTENANCE OR REDECORATION OF THE BUILDING FABRIC IS REQUIRED.

WHERE TWO ROWS OF EQUIPMENT FACE EACH OTHER (CONTROL PANELS AND/OR SWITCHGEAR) THE CLEAR DISTANCE BETWEEN FRONT FACES SHALL NOT BE LESS THAN 1.8M, INCREASED AS NECESSARY TO FACILITATE ACCESS FOR TEST GEAR AND FOR REMOVAL FOR REPLACEMENT OF EQUIPMENT.

THE CLEAR DISTANCE IN FRONT OF EQUIPMENT SHALL PROVIDE OPERATORS WITH A FULL VIEW OF INSTRUMENTS AND INDICATIONS TO THE UNIT UNDER CONSIDERATION AND TO THE UNITS IMMEDIATELY TO EITHER SIDE AND SHALL NOT BE LESS THAN 1.2M.

REQUIREMENTS FOR CLEAR PASSAGE AND OPERATING DISTANCE SHALL BE CLEAR OF OBSTRUCTIONS SUCH AS WALLMOUNTED EQUIPMENT OR TOOLS, RADIATORS, SERVICES, STRUCTURAL PROJECTIONS AND THE LIKE AS WELL AS EQUIPMENT DOOR OPENINGS UNLESS THESE ARE EITHER REMOVABLE OR WILL OPEN THROUGH APPROXIMATELY 180°.

03- SUBSTRUCTURE
DAMP PROOF MEMBRANE SYSTEMS INCORPORATING MEMBRANE PROTECTION SHALL BE PROVIDED TO FULLY ENCLOSE BELOWGROUND MASONRY SUBSTRUCTURE CONSTRUCTION TO OPERATIONAL ROOMS WITH BELOW FLOOR CABLE ACCESS.

THIS DAMP PROOF SYSTEM MAY BE OMITTED TO REINFORCED CONCRETE SUBSTRUCTURE CONSTRUCTION IN APPROPRIATE SITE-SPECIFIC SITUATIONS.

SUB-FLOOR INFILL SHALL BE WEAK-MIX CAST IN SITU CONCRETE.

CABLE TRENCHES FORMED WITHIN SOLID FLOOR CONSTRUCTION SHALL HAVE REINFORCED CONCRETE BOTTOMS AND SIDES OR MAY HAVE MASONRY SIDES WHERE THESE ARE ABOVE STRUCTURAL REINFORCED CONCRETE RAFTS.

05- FLOOR
TRENCH WORK WITHIN SOLID CONCRETE CONSTRUCTION SHALL INCORPORATE GALVANISED STEEL OR GRP KERB REBATES CAST WITHIN FLOORS TO RECEIVE TRENCH COVERS.

REINFORCEMENT WITHIN THE TOP SURFACE OF FLOOR SLABS WITHIN GIS SUBSTATION SWITCH ROOMS SHALL BE BONDED TO THE SUBSTATION EARTH SYSTEM IN ACCORDANCE WITH THE REQUIREMENTS OF THIS SPECIFICATION.

STRUCTURAL FLOOR SLABS SHALL BE CONTINUOUS AT DOORWAYS, INCLUDING SUSPENDED SLAB CONSTRUCTION OVER TRENCHES WHERE APPLICABLE. SAND FILL WITH SCREED TOPPING OR SUSPENDED TRENCH COVER SYSTEMS SHALL NOT BE ACCEPTABLE TO TRENCHES AT THESE LOCATIONS.

CONCRETE FLOORS SHALL BE PREPARED AND PAINTED WITH 2NO. COATS OF A PROPRIETARY ANTI-SLIP FLOOR PAINT SYSTEM STRICTLY IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS ONCE FLOOR IS CURED. SLIP-RESISTANT FLOOR PAINT SYSTEMS TO BATTERY ROOMS WITH SEALED BATTERIES (VALVE-REGULATED) SHALL ADDITIONALLY BE ACID RESISTANT.

06- MASONRY
MATERIALS SHALL BE SELECTED TO MAXIMISE DURABILITY CONSISTENT WITH THE ARCHITECTURAL OR PLANNING REQUIREMENTS FOR THE SUBSTATION.
THE MINIMUM ACCEPTABLE STANDARD FOR BELOWGROUND MASONRY SHALL BE HIGH DENSITY (HD), CATEGORY I CLAY BRICKWORK OF MINIMUM 75N/MM2 MEAN COMPRESSIVE STRENGTH, 7.0% MAXIMUM MOISTURE ABSORPTION AND DURABILITY DESIGNATION F2 S2 (EX-ENGINEERING CLASS B' QUALITY DESIGNATION OR EQUIVALENT).

EXTERNAL MASONRY SHALL BE HD CLAY-FACING BRICKWORK OF MINIMUM 30N/MM2 MEAN COMPRESSIVE STRENGTH, MAXIMUM 12% MOISTURE ABSORPTION AND DURABILITY DESIGNATION F1 S1 OR BETTER.

WHERE IT IS ESSENTIAL TO PROPOSE THE USE OF LOWER QUALITY EXTERNAL MASONRY TO MEET PLANNING AUTHORITY OR OTHER AESTHETIC REQUIREMENTS. IN SUCH CIRCUMSTANCES IT MAY BE NECESSARY TO APPLY AN APPROPRIATE COATING SYSTEM SUCH AS A SILOXANE HYDROPHOBIC IMPREGNATION TO ENSURE THAT UNDUE MOISTURE PENETRATION IS PREVENTED.

WALLS SHALL INCORPORATE AS NECESSARY ANY COMBINATION OF STRUCTURAL FRAMING, ENHANCED CAVITY TIES, BED-JOINT REINFORCEMENT, WIND POSTS OR ENHANCED LATERAL RESTRAINT (INCLUDING THAT FROM ROOFS) TO MITIGATE THE IMPACT OF DISRUPTIVE FAILURE.

INTERNAL MASONRY ENCLOSING ROOMS THAT HOUSE HIGH VOLTAGE SWITCHGEAR SHALL BE LIGHT-COLOURED SOLID SMOOTH FAIR-FACED CLAY OR CONCRETE FACING BRICKWORK OF MINIMUM 20N/MM2 COMPRESSIVE STRENGTH AND MAXIMUM 12% MOISTURE ABSORPTION.

INTERNAL MASONRY WALLS AND THE INNER LEAVES OF CAVITY MASONRY WALLS TO TRADITIONALLY BUILT ENCLOSURES THAT HOUSE HIGH VOLTAGE SWITCHGEAR OR TRANSFORMERS SHALL BE SOLID BRICKWORK CONSTRUCTION MINIMUM 215MM OVERALL THICKNESS UTILISING CLAY OR CONCRETE BRICKS.

INTERNAL MASONRY GENERALLY SHALL OTHERWISE BE THE CONSTRUCTORS DESIGN RESPONSIBILITY, HOWEVER; MODULAR, CELLULAR, HOLLOW AND SOME FORMS OF PERFORATED MASONRY UNITS WOULD NOT BE ACCEPTABLE. IT IS ESSENTIAL THAT WALLS TO SUPPORT EQUIPMENT PRESENT A SMOOTH PLUMB EVEN SURFACE.

MORTAR GRADE SHALL BE APPROPRIATE FOR THE MASONRY TYPE, INCLUDING THE USE OF SULPHATE RESISTING CEMENT WHERE NECESSARY (E.G. IN CERTAIN BELOWGROUND CONDITIONS). IN PARTICULAR, MORTAR TO INTERNAL CONCRETE BRICKWORK SHALL BE CLASS III.

BRICKWORK TIES TO CAVITY WALLS SHALL BE STAINLESS STEEL TYPE 1 OR TYPE 2 CONSTRUCTION EVENLY SPACED AT MAXIMUM 450MM CENTRES VERTICALLY AND 450MM CENTRES HORIZONTALLY, STAGGERED IN ALTERNATE COURSES.
WHERE UTILISED, MASONRY BED-JOINT REINFORCEMENT SHALL BE STAINLESS STEEL CONSTRUCTION.
WHERE UTILISED, BUILT-IN WIND POSTS SHALL BE GALVANISED OR STAINLESS STEEL CONSTRUCTION.

DAMP PROOF COURSES SHALL BE INCORPORATED AND SHALL BE EITHER HIGH DENSITY (HD) CATEGORY I CLAY BRICKWORK OF MINIMUM 125N/MM2 MEAN COMPRESSIVE STRENGTH, 4.5% MAXIMUM MOISTURE ABSORPTION AND DURABILITY DESIGNATION F2 S2 (EX-, ENGINEERING CLASS A' QUALITY DESIGNATION OR EQUIVALENT) OR PROPRIETARY HIGH PERFORMANCE (HIGH LOAD/STRENGTH, HIGH BOND) PITCH-POLYMER SYSTEMS.

ROOF
ROOFS SHALL PROVIDE A MAXIMUM OVERALL THERMAL TRANSMITTANCE U VALUE NOT EXCEEDING 0.25W/M2K.

ROOFS SHALL BE DESIGNED SUCH THAT THEY ELIMINATE OR PROTECT AGAINST THE RISK OF FAILURE DUE TO VANDALISM OR THEFT. IN PARTICULAR IN RELATION TO TRADITIONAL CONSTRUCTION PITCHED ROOFS WHERE THIS COULD LEAD TO DISRUPTIVE FAILURE. FOR THIS REASON OR IN RELATION TO THE POTENTIAL FOR DISRUPTIVE FAILURE OF PLANT AND PROVISION OF ADEQUATE LATERAL RESTRAINT TO WALLS. TRADITIONAL CONSTRUCTION PITCHED ROOFS MAY REQUIRE INCORPORATION OF A WATERPROOFED STRUCTURAL REINFORCED CONCRETE SLAB OR OTHER EQUAL APPROVED ROBUST SUB-ROOF CONSTRUCTION BENEATH (NOT APPLICABLE TO STEEL-FRAMED CLAD BUILDING CONSTRUCTION).

THE USE OF LEAD AS PART OF WATERPROOFING SYSTEMS SHOULD BE AVOIDED UNLESS ESSENTIAL FOR PLANNING PURPOSES. IN ORDER TO LIMIT THE POTENTIAL FOR VANDALISM AND THEFT AND THEREBY MITIGATE AGAINST THE RISK OF DISRUPTIVE FAILURE.

ROOFS ENCLOSING SWITCHGEAR OR TRANSFORMERS - DISRUPTIVE FAILURE
ROOFS THAT ENCLOSE HIGH VOLTAGE SWITCHGEAR SHALL BE ADEQUATELY ROBUST AND/OR INCORPORATE DESIGNED PRESSURE RELIEF SUCH THAT PROGRESSIVE COLLAPSE DOES NOT ENSUE IN THE EVENT OF DISRUPTIVE FAILURE, INCLUDING PROVIDING ADEQUATE LATERAL RESTRAINT TO WALLS WHERE NECESSARY.

ROOFS THAT ENCLOSE HIGH VOLTAGE SWITCHGEAR SHALL BE ADEQUATELY ROBUST AND/OR INCORPORATE PRESSURE RELIEF PANELS SUCH THAT POTENTIALLY HAZARDOUS ROOFING MATERIAL IS NOT DISCHARGED TO ADJACENT PUBLIC AREAS IN THE EVENT OF DISRUPTIVE FAILURE.

BUILT-UP FELT WATERPROOFING SYSTEMS (INSULATED SYSTEM)
BUILT-UP FELT WATERPROOFING SYSTEMS TO EXPOSED CONCRETE ROOFS SHALL BE INSULATED SYSTEMS COMPRISING PREPARATION, VAPOUR BARRIER, VENTING BASE LAYER OVER SOLID POLYISOCYANURATE OR SIMILAR INSULATION BOARD AND MINIMUM TWO LAYER POLYESTER REINFORCED HIGH-TENSILE HIGH-PERFORMANCE ELASTOMERIC FELTS WITH MINERAL SURFACE FINISH TOP SHEET. UNDERLAY AND TOP SHEET SHALL BE TAKEN FULL WIDTH OVER PARAPET UPSTANDS. ROOF-EDGE TRIMS SHALL BE GRP CONSTRUCTION.

WATERPROOF COVERINGS TO FLAT ROOFS
PROPRIETARY SYNTHETIC COVER FLASHINGS SHALL BE PROVIDED TO UPSTANDS TO HIGHER LEVEL ELEVATIONS OF BUILDINGS AND BOTH UPSTANDS AND COVER FLASHINGS SHALL BE CHASED INTO JOINTS AND APPROPRIATELY POINTED.

MASTIC ASPHALT WATERPROOFING SYSTEMS
MASTIC ASPHALT WATERPROOFING SYSTEMS TO CONCRETE ROOFS SHALL COMPRISE PREPARATION AND TWO-COAT ROOFING GRADE MASTIC ASPHALT NOT LESS THAN 20MM THICK OVERALL, LAID TO BREAK JOINT AND INCORPORATING SHEATHING FELT UNDERLAY BENEATH.

UPSTANDS AND APRON DOWNSTANDS SHALL NOT BE LESS THAN 12MM THICK OVERALL, INCORPORATING FILLETS AND GALVANISED OR STAINLESS STEEL METAL BACKING MECHANICALLY FIXED TO THE SUBSTRATE.

ASPHALT SYSTEMS SHALL RECEIVE TWO COATS OF SOLAR REFLECTIVE PAINT FINISH.

DOORS
EXTERNAL METAL SECURITY DOORS SHALL BE PROPRIETARY CORROSION RESISTANT STEEL OR ALUMINIUM UNITS, PROPOSED DETAILS OF WHICH SHALL BE SUBMITTED TO ENERGYNETWORKS FOR COMMENT AND ACCEPTANCE PRIOR TO PROCUREMENT.

METAL SECURITY DOORS SHALL BE BONDED TO THE SUBSTATION EARTH SYSTEM IN ACCORDANCE WITH THE REQUIREMENTS OF THE GENERAL SPECIFICATION FOR THE CIVIL ENGINEERING AND BUILDING DESIGN AND CONSTRUCTION OF PRIMARY SUBSTATIONS. SUB-03-025 ISSUE 01.

DOORS SHALL BE OF ROBUST CONSTRUCTION THAT OFFERS A HIGH DEGREE OF SECURITY AGAINST UNAUTHORISED ENTRY.

DOORS SHALL INCORPORATE PROTECTIVE SURFACE FINISHES THAT ARE DURABLE AND MAXIMISE PERIODS BETWEEN MAINTENANCE.

ALL DOORS SHALL BE EMERGENCY ESCAPE DOORS, INCLUDING DOORS PROVIDING ACCESS INTO BUILDINGS. THE NUMBER OF DOORS HAVING EXTERNAL LOCKING TO ACCESS BUILDINGS SHALL BE KEPT TO A MINIMUM CONSISTENT WITH ADEQUATE SAFE OPERATIONAL USE (TO LIMIT OPPORTUNITIES FOR UNAUTHORISED ENTRY).

EMERGENCY ESCAPE DOORS SHALL OPEN OUTWARDS.

REV	DATE	REVISION NOTE	BY	CHECK
P01	06.04.25	Layout and General Arrangement		

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/INDURENT

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PROJECT |
Indurent - Heywood Main Scheme
DRAWING TITLE |
SUBSTATION - AXONOMETRIC VIEW
250031_HYD-SMP-ZZ-ZZ-DR-ME-CCP-007
STATUS | SCALE | @ A0 DNO REF |
DRAWN BY | TO DATE | 03/01/21 IDNO REF |
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