A ARCHITECTURAL

A.1 Openings in Envelope - Roller Shutter doors
Receiving Area: 2500mm (w) x 2500mm (h) Approved Industrial 45mm thick vertical lift sectional door. Aluminium sections infilled with polyurethane foam, stucco-textured inside and outside with uniform horizontal ribbing. Electrically operated with motor as supplied by manufacturer. Neoprene top weather strip for full width of door, neoprene bulb weather strip with continuous retainer full width of bottom of door. Dual replaceable seals between sections.
Door opening will be formed in brickwork with precast concrete lintels to top of opening, reveals plastered and painted.
Door to be protected by concrete filled bollards placed internally and externally on either side of the door opening.

A.2 Openings in Envelope - Windows
No external openings will be made for windows in Data Centre Halls.
Windows in office accommodation to be powder coated aluminium in accordance with Sans 1578 parts 1 and 2. HBS Advantage curtain wall pressure glazing system built into brick walling/concrete frame. System to meet requirements of AAAMSA performance and design loading of SANS 10160.

A.3 Data Centre Halls, Meet-Me Rooms and Support Rooms - CLASSIFICATION – D4
External walls will be 280mm cavity clay brick on strip foundations to engineer's detail.
External finish with one coat wood floated plaster suitably prepared for painting with two coats Plascon Micatex. Internal finish with one coat wood floated plaster suitably prepared for painting with two coats Plascon "Wall n All" in light tint colour.

Internal walls will be formed using 230mm clay brick walls with all exposed surfaces finished with one coat wood floated plaster skimmed with Plascon Skim Coat PSI-1, primed and suitably prepared for painting with two coats Plascon "Wall n All" in light tint colour.

Concrete surface beds generally 35/19Mpa 150mm thick to carry a load of 500kg/m2.
Raised access flooring 1200mm above surface beds to be Bergvik 600x600 ESD Iso Floor with uniform distributed load of 20kN/m².
Surface bed, plinths and walls below access floor to be suitably prepared for painting with two coats Plascon Wall and All.
Concrete plinth 150mm high to be provided around all 160mm service sleeves. Two No. Green Drain waterless self-sealing trap type floor drains to be provided in surface bed per room.

Skirtings to be 19x69mm Hollow backed meranti skirting with arris rounded top edge, with 19mm Meranti quadrant to skirting base, suitably prepared for painting with two coats Plascon Velvaglo.

3200mm High ceilings will be 100mm Isophen FM Global Polyphen or equal and approved Insulated ceiling panels, Class 1 fire rated supported on proprietary ceiling grid system including aluminium angle as cornice to side walls all to Engineer approvals. Note cut-outs required for all fittings and ceiling services. Ceiling panels to be constructed such that they can be walked on in order to install all services.

Internal doors to be standard internal quality 2hr fire rated hinged doors in suitable 1.6mm gauge double rebated galvanized steel frame and fire rated doorset. Doors to be suitably prepared for painting with two coats Plascon Velvaglo. All doors to be installed with electromagnetic locking devices and linked to fire and access control system. All in compliance with SABS 1253 : 2016 for appropriate fire rating.

External doors to be standard external quality 2hr fire rated hinged doors with viewing panels in suitable 1.6mm gauge double rebated galvanized steel frame and fire rated doorset. Doors to be suitably prepared for painting with two coats Plascon Velvaglo. All doors to be installed with electromagnetic locking devices and linked to fire and access control system. All in compliance with SABS 1253 : 2016 for appropriate fire rating.
No external openings will be made for windows in Data Centre Halls.

600x600 Painted wall markings on wall 100mm below ceiling level, to align with access floor panels/grid system. Numbering reference as per section detail. Room name painted on wall adjacent to entrance door and on internal wall positioned opposite entrance door.

A.4 Utility Rooms - CLASSIFICATION – D4 / Generator & Diesel Storage - CLASSIFICATION J1
External walls will be 280mm cavity clay brick on strip foundations to engineer's detail.
External finish 1020mm high facebrick plinth with facebrick above.

Facebrick plinth - Makana Brick 43MPa Heritage Travertine FBX burnt clay masonry unit, size 222x106x73mm, manufactured in accordance with 227:2007, bedded and jointed in Class II mortar and pointed with flush vertical and recessed horizontal joints, suitable for exposure to zones 1-4.

Facebrick - Makana Brick 43MPa Heritage Travertine FBX burnt clay masonry unit, size 222x106x73mm, manufactured in accordance with 227:2007, bedded and jointed in Class II mortar and pointed with recessed vertical and recessed horizontal joints, suitable for exposure to zones 1-4

Internal walls will be formed using 230mm clay brick walls with all exposed surfaces finished with one coat wood floated plaster suitably prepared for painting with two coats Plascon "Wall and All" in light tint colour.

Surface beds generally 35/19Mpa 150mm thick, reinforced mesh ref 395, 35MPa power floated concrete, primed with Sikafloor 161 and finished with 4mm Sika Polyurethane finish.

3230mm High suspended concrete roof slab with perimeter beams all to Structural Engineer's specification. Soffit prepared for painting with two coats Plascon Wall and All.

Doors will be purpose made powder coated fully louvered aluminium doors in accordance with Sans 1578 parts 1 and 2. HBS Nuklip system built into brick walling. System to meet requirements of AAAMSA performance and design loading of SANS 10160.

Louvres will be purpose made powder coated aluminium louvres in accordance with Sans 1578 parts 1 and 2. Louvre and filter type to Mechanical Engineer's specification.

Fencing around HVAC equipment will be 1800mm high Clearview pressed high density mesh panel with aperture size 76.2 x 50mm. Mesh and posts got dip galvanised with coastal fusion bond finish, complete with 10-year underwritten guarantee all to manufacturers detailed instructions. System to be installed bolted to floor with proprietary system and posts and panels to be secured together using manufacturer's approved system.

A.5 Offices and Ablutions – Single Storey – CLASSIFICATION - G1
External walls will be 280mm cavity brick on strip foundations to engineer's detail.
External finish 1020mm high facebrick plinth with facebrick above.

Facebrick plinth - Makana Brick 43MPa Heritage Travertine FBX burnt clay masonry unit, size 222x106x73mm, manufactured in accordance with 227:2007, bedded and jointed in Class II mortar and pointed with flush vertical and recessed horizontal joints, suitable for exposure to zones 1-4.

Facebrick - Makana Brick 43MPa Heritage Travertine FBX burnt clay masonry unit, size 222x106x73mm, manufactured in accordance with 227:2007, bedded and jointed in Class II mortar and pointed with recessed vertical and recessed horizontal joints, suitable for exposure to zones 1-4

Internal walls will be formed using 230/110mm clay brick walls with all exposed surfaces finished with one coat wood floated plaster skimmed with Plascon Skim Coat PSI-1, primed and suitably prepared for painting with two coats Plascon "Wall n All" in light tint colour.

Concrete walls to be off-shutter concrete CLASS 2 board marked textured finish. Refer to Engineer's details and specifications

Internal partition walls in general office areas will be constructed using Gyproc Gypwall Classic 63/F30S42 system, prepared for painting using Plascon "Wall n All" in light tint colour.

Internal sound insulated partition walls to meeting rooms and Executive Offices will be constructed using Gyproc Gypwall Firestop 63/F60 system using Cavitybatt, prepared for painting using Plascon Wall and All.

Partitions walls higher than 3250mm to be built using 102mm studs with 60min fire rating and 52dB sound rating. Wall stud sizes and centres to be as set out by Gyproc Isover detailed instructions.

Skirtings to brick walls will be 19x69mm Hollow backed meranti skirting with arris rounded top edge, with 19mm Meranti quadrant to skirting base, suitably prepared for painting with two coats Plascon Velvaglo.

Skirtings to partition walls will be standard 70mm high natural anodised aluminium

Concrete surface beds generally 30/19MPa 100mm thick with mesh 245 reinforcement, to carry a load of 500kg/m2.
Floor finishes;

Reception & circulation areas:		Porcelain tiles
Offices	:	Heavy Commercial grade Belgotex Berberpoint 920 carpet tiles.
Toilets or tea kitchens	:	Porcelain tiles
Storerooms	:	2mm Marley Supaflex vinyl sheet in "base range" colours.
Staging Area	:	2mm FloorworX SD directional static dissipative vinyl sheeting, manufactured in accordance with EN 649 and laid over an earthed grid of aluminium tape in FloorworX No.27 conductive acrylic adhesive which has been spread using a trowel fitted with an A2 notched blade at a rate of between 5.5m² and 6.5m² per litre on a previously prepared Class 1 sub-floor in accordance with SANS 10070, using FloorworX Self Leveller when required

Toilet and wet areas will be tiled with ceramic wall tiles to architects detail to ceiling height.

Ceilings to office accommodation will be 600 x 600mm suspended acoustic ceiling tiles laid in exposed aluminium T-grid. The ceiling height will be 2720mm above floor level and have a ceiling void of a minimum of clear 450mm depth above. 9mm Gypsum bulkheads along junctions with ceiling and suspended slabs at stairs and walkways.

Escape stair concrete roof slab primed with abe bitu-prime, abe Index VIS P 3mm torch-on applied to all 90° junctions as gussets and finished with abe Index Unigum Biarmato MS torch-on, all in accordance with the manufacturer's instructions.

Escape stair concrete roof slab and concrete stair soffits to be prepared for painting with two coats Plascon Wall and All.

Ceilings to ablutions will be 600 x 600mm suspended vinyl clad gypsum ceiling tiles laid in exposed aluminium T-grid. The ceiling height will be 2720mm above floor level and have a ceiling void of a minimum of clear 450mm depth above.

Internal service room doors to be flush panel 2400 x 813mm solid core doors with concealed edges finished with primer and two coats Plascon Velvaglo.

Internal doors to ablutions and tea kitchens to be purpose made 2400x900mm powder coated aluminium doors with 6.38mm Intruderprufe NS clear laminated safety glass with white opaque vinyl film.

Internal doors to offices and meeting rooms to be purpose made 2400x900mm powder coated aluminium doors and 1500mm wide sidelight, with 6.76mm Acoustic clear laminated safety glass with vinyl film pattern.

A.6 Offices and Ablutions - Double Storey– CLASSIFICATION - G1
Suspended reinforced concrete slab on load bearing brickwork designed for:
Occupancy load = 300 Kg/m2
Partition load = 200 Kg/m2
Office accommodation and ablution ceilings as for single storey offices

A.7 Roof Sheeting and Insulation
Huletts Aluminium 'Global Roofing Solutions' 0,9mm thick Ziptech 420 Profile aluminium roof sheeting and accessories with stucco embossed mill finish, concealed fixed through insulation to galvanised cold rolled purlins with insulation tape between purlin and roof sheet, with 'Ziptech' Aluminium Halters fixed with stainless steel screws. Installation region: from 0m to 400m of the coast – C5 High Corrosion Risk. All in strict accordance with the manufacturer's instructions.

Isover 75mm Factorylite insulation laid over purlins in single lengths and supported on galvanised straining wires at 300mm centres.

Solar hot water system and Photovoltaic panel system to be fixed to Ziptech roof sheets using 'Global Roofing Solutions' approved aluminium structural clamps

Eaves to be closed with inverted sheeting and fixed to underside GMS purlins to Structural Enginerr's details. Sheeting to be Huletts Aluminium 'Global Roofing Solutions' 0,8mm thick BR7 Profile stucco embossed mill finish, . All in accordance with the manufacturer's instructions.

A.8 Gutters and Downpipes
150x150x0.9mm Aluminium gutter with stucco embossed mill finish, fixed with aluminium gutter brackets at max 500mm cntrs, gutter edge fixed to roof sheeting with 25mm wide aluminium gutter straps, all in accordance with manufacturer's instructions.

100x75x0.9mm Aluminium down pipes with stucco embossed mill finish, fixed to brickwork with 25mm wide aluminium gutter straps.
Downpipes fixed to gutter conical rainwater outlet.
Downpipes at 6m intervals.

Fullbore outlets & gravity drainage used for exposed concrete roof slabs.

A.9 Side Cladding
Huletts Aluminium 'Global Roofing Solutions' 0,8mm thick BR7 Profile embossed aluminium vertical cladding with Azure Blue Color-Tech G4 finish, from 4000mm above finished floor level to eaves level, fixed to galvanised cold rolled girts with insulation tape between girt and cladding with stainless steel screws. Bottom edge of side cladding to eastern and western facades to be angled, fixed to girts fixed onto brickwork. Installation region: from 0m to 400m of the coast – C5 High Corrosion Risk. All in accordance with the manufacturer's instructions.
No side wall insulation is provided.

A.10 Rainwater Harvesting
Provide 8 x 5000l vertical water tanks, placed above ground on raised platform along northern façade. Tanks to be interconnected and include suitable submersible pump and filtration for connecting to grey water flushing system.

A.11 Perimeter Fencing
Fencing around SITE will be 2400mm high Clearview pressed high density mesh panel with 600mm high electrification above fence. Panel aperture size 76.2 x 50mm. 400mm Wide concrete mowing edge along fence. One 5000mm wide automated sliding gate positioned at site entrance. One 900mm wide pedestrian gate with access control positioned at site entrance for visitor access.

Fencing around Visitors Parking and Utility Area will be 1800mm high Clearview pressed high density mesh panel. Panel aperture size 76.2 x 50mm. 400mm Wide concrete mowing edge along fence. One 4500mm wide automated sliding gate positioned at Utility Area.

Mesh and posts got dip galvanised with coastal fusion bond finish, complete with 10-year underwritten guarantee all to manufacturers detailed instructions.

System to be installed with proprietary system and posts and panels to be secured together using manufacturer's approved system.

Colour : Anthracite Grey

S STRUCTURAL

S.1 Concrete Surface Beds

GATE HOUSE AND OFFICES

Concrete to be 30/19MPa, 100mm thick with mesh ref. 245

DATA CENTER AND ELECTRICAL, HVAC, UPS ROOMS

Concrete to be 35/19Mpa with washed sand, 150mm thick jointed with fibre reinforcing "fibrin 900g/m³".(Mesh 395 only if required by client) Construction and Saw-cut joints to be max 4m x 4m panels, length to width ratios of the panels not to exceed 1,25. Levelness and flatness specification to be SABS 1200 class II. Damp proofing membrane 250 micron to be installed under surface beds on 20mm sand bedding.

Minimum layer works below all floors;
150mm layer G5 compacted to 95%Mod Aashto at OMC
150mm layer G7 compacted to 95%Mod Aashto at OMC

S.2 Structure – Columns/Beams

First floor offices to be constructed with reinforced concrete columns / beams framed structure with brick infill panels.

Design imposed loading: First floor Offices for general use: 2,5KPa

Reinforced pad footings with R.C. stub columns
Reinforced strip footings

S.3 Roof Structure

The roof structure consists of Parallel chord trusses (3°) spaced at 6,115m centres, minimum depth 1000mm.
Parallel chord lattice trusses at various spans, max 12,5m.
Shorter spans over offices and HVAC to have steel rafters.
Services load is 40 kg/m² with 20 kg/m² reserved for standard mechanical and electrical services and 20 kg/m² available for tenant services, Plus additional 20 kg/m² for PV panels.

Main support columns, reinforced concrete.
Gable Columns: reinforced concrete.

All steel hot dipped galvanised.

S.4 Canopies
2500mm wide cantilevered structural steel canopy will be provided above Receiving Area roller shutter door.

S.5 Staircases
Staircases to upper levels of offices are reinforced concrete. Galvanised mild steel internal staircases will be used to provide access to mechanical equipment above Data Centre Hall ceiling level.

T TELECOMMUNICATIONS

T.1 Electric Fence
The Contractor shall provide a security compliant perimeter electrified fence.
The fence shall be monitored and shall comprise of the following:

- 3000mm high perimeter security fence
- Configured into expandable zones
- Galvanised tensioners on both ends
- Instant reporting alarm conditions
- Stainless steel slider poles
- 29 strand fence wire in the "earth and live" method
- Stainless steel straining wire

T.2 Access Control – Biometrics / Locking Devices
The access control and locking devices system shall be installed in accordance with the relevant South African National Standards documentation and shall comprise (per lockable door)

- Installed biometric readers
- Magnetic locking or fail to safe locking devices to be installed
- Connection via relay to fire detection system in case of emergency
- Fully monitored devices for recording of entry and exit of staff member and visitors

T.3 Access Control – Booms
The Contractor shall allow for the complete installation of all conduits, outlet boxes, plinths, booms, loops, etc., required for the access boom control system namely.

- Install Auto-Gate red and white, powder coated full 316 stainless steel chassis booms
- Install red and white reflective barrier arms
- Ensure harmonic lifting on all operational booms
- Install presence and exiting loops for each boom
- Install control panel in the guardhouse with lock out
- Removable key lockout

T.4 Security Intruder Alarm
The Contractor shall allow for the complete installation of all conduits, outlet boxes, passives, control panels, wiring, power supply units etc., required for the intruder alarm system namely.

- Door monitored statuses to be reported from the magnetic devices on each external door
- Self-activated (pet & rodent friendly) passives for the monitoring of each room
- Capable of connecting to offsite monitoring
- Give the user ability to arm and disarm via wireless and a fixed keypad station

Ensure GSM capabilities for client monitoring

T.5 Closed Circuit Television
The Contractor shall allow for the complete installation of all conduits, outlet boxes, IP cameras, recorders, switches, etc., required for the closed circuit television system and be capable of the following:

- 24 hour scheduled recording and event logging
- Installation of Internet protocol cameras
- Installed unmanaged switches with power over Ethernet in wall mounted cabinet
- Client viewing from any mobile device
- NVR based recording system
- Lockable cabinet with tinted glass
- Minimum of 2 by 4 TB Hard drives to be installed

T.6 Data Network and IP Telephone System
The Contractor shall allow for the complete installation of all conduits, outlet boxes, data/telephone points, recorders, switches, PABX, etc., required for the private and closed internet protocol network and have the following capabilities and characteristics:

- Run at 1 Gig high speed network or above
- Flush mounted cat6e connection points at all points
- Internet protocol telephone handsets to be user friendly
- Cabinet mounted unmanaged 24 port 1 gig switches
- Colour coded fly-leads to be installed at all brush panels
- Black cabinet mounted brush panels to be installed

G GENERAL

G.1 Landscaping
ELIDZ will provide site landscaping.

G.2 Inclusions

The following services, unless otherwise stated or agreed, will be provided by the landlord:
Standby diesel generators
UPS equipment
Surge Protection
Internal computer network cabling
Computer access flooring
Internal PABX and telephone networks
Electricity reticulation from the internal site electricity network to tenant's plant components
Internal division walls within Data Centre
Gas suppression
Floor drains
Bulk storage tanks – Rainwater Harvesting
AC and ventilation plant.
Fire suppression system and general fire protection.
Building, operational and tenant signage.
Special security systems and access control.
Electrified perimeter fence and automated sliding gates.

G.3 Exclusions
The following services, unless otherwise stated or agreed, are not provided by the landlord:
Furniture, fixtures and fittings.
Computers.
Tea Kitchen equipment.
Lockers.
Special foundations for tenant's equipment.
Compressor rooms.
Compressed air supply and equipment.
Forklift refuelling enclosures.
Water supply, effluent control and other under floor wet services to process areas.
Steam generation.
Logistics equipment.
Dock levellers.
Specialised lifting equipment and crawler beams.
Power factor correction equipment.

C CIVIL

C.1 External Hard Standing
External hardstands will consist of 200mm thick, Unreinforced 30MPa/38mm concrete on two layers of imported G5 type material.
Jointing of concrete surfaces will be designed by the Engineer and will consist of sealed saw cut joints and sealed construction joints.
Construction joints will be fitted with 115 x 115 x 6mm galvanised steel plates. Saw cut joints to be min 6mm width with an effective cut of 1/3 the depth of the hard stand surface, cut in a two-cut process. Construction joints to be min 6mm effective width fitted with a backing strip and sealant. Joint sealant to be specified and approved by the ELIDZ, joint sealant to be silicone free.
Saw cut panels to have maximum dimensions of 4.5m x 4.5m.
Expansion joints against building edges or structures.
Finishes of hardstand areas will be to a mechanical float "Pan Finish" texture.
Curing of hardstand surface will be via an approved curing compound acceptable to the design Engineer.

Hardstands will be cast to falls away from buildings to drainage collectors such as kerb inlets along roads edge with underground concrete storm water pipes class 100D, sized to take a 1 in 5-year flood event. Heavier rain will result in surface water drainage across the site to site entrances and onto external roads. Were collection of storm water cannot be achieved along the road/hardstand edge, drop inlet structures with heavy duty grill covers are to be positioned at the required design intervals and trapezoidal shaping of hardstands designed to achieve drainage to falls not exceeding 1:20 to the drop inlets must be constructed. Where there is evidence of sub-surface ground water on site, A sub soil drainage system must be designed by the engineer.

Office and visitor parking area – will consist of 200mm thick Unreinforced 30MPa/38mm concrete on two layers of imported G5 type material. The same as specified above.

Traffic manoeuvring models are to be verified and reported on to the ELIDZ, and to the requirements of the tenant.

C.2 Kerbing and Access Ramps
Hardstand edges finished with 180mm high precast Fig.3 type barrier kerbs set on 15MPa concrete haunching. Space from building to back of kerb is finished with bond paved sidewalks of varying widths with lawns or planted areas in between. Pavers will consist of 80mm interlocking pavers colour to architect's specification on a 2 x 150mm G5 type base.

Access Ramps with vehicle traffic will consist of 200mm thick, Unreinforced 30MPa/38mm concrete on two layers of imported G5 type material. The access ramps to have a 1:13 slope between hardstand and finished floor level with 10mm weather step.
Access ramps for pedestrian use only will consist of 100mm thick, unreinforced 25MPa/19mm concrete on a 150mm subbase layer of G7 type material with a 150mm base layer of G5 type material. Concrete panels via saw cuts at 2.5m max.

C.3 Access to Sewage and Water Reticulation.
Municipal services are provided along the road reserve. The site is serviced with a sewer and water connection point.

The underground sewers servicing the building must be provided to accommodate all the internal plumbing outlets. The minimum diameter and class are 110mm uPVC Class 34 solid wall pipe.

Water supply mains provide 20 kl per day per hectare of erf area with a max head of 90m and a min of 25m. Separate metered connections to each building must be provided. A separate external fire main must be provided to supply the fire hydrants for the building.

M MECHANICAL AND FIRE

M.1 Air-conditioning
M1.1 Offices
Air-conditioning shall be a VRV type system (Daikin or similar approved).

M1.2 Data Centre Halls / Meet-Me Rooms
Air-conditioning shall be a chilled water system with internal variable speed control air-handling cabinets (CRAC Units), with dual redundancy allowance, including leak sensors, temperature and humidity control and monitoring, high efficiency filtration, high energy efficiency, set point stability, rotation / back-up / auxiliary functions between cabinets and the entire air-conditioning system shall meet the requirements of a Tier III Classification.

M1.3 Utility Rooms
Air-conditioning shall be a chilled water system or a DX system with internal variable speed control air-handling cabinets, with dual redundancy allowance, including temperature and humidity control and monitoring, high efficiency filtration, high energy efficiency, set point stability, rotation / back-up / auxiliary functions between cabinets and the entire air-conditioning system shall meet the requirements of a Tier III Classification.

M1.4 General
It is intended that the Data Centre facility shall be awarded the Tier III Classification. This classification means "concurrently maintainable", i.e. it must be possible that each and every capacity component and distribution path servicing the Data Centre facility must be able to be removed, on either a planned basis or for maintenance / replacement, without impacting the proper operation of the Data Centre facility.

External condenser units shall have a secondary corrosion resistant protection coating (Blu-chem or similar approved).

All air-conditioning units shall be provided with wired type controls and shall be integrated into a BMS system and shall meet the requirements of a Tier III Classification.

M.2 Fire Protection
M2.1 General
The site and building are to be designed and constructed in accordance with the National Building Regulations SANS 10400 "Part T".
The building is to be divided (fire divisions, etc.) in such a manner so as it does not need a sprinkler installation.

Data Centre Halls and Meet-Me Rooms are to be 120 minute fire rated rooms, therefore any penetrations are to be fire proofed accordingly, by using correct passive fire protection methods (fire stops, fire dampers, etc.) in accordance with relevant SANS Standards (SANS 10400 / SANS10177).

It is intended that the Data Centre facility shall be awarded the Tier III Classification. This classification means "concurrently maintainable", i.e. it must be possible that each and every capacity component and distribution path servicing the Data Centre facility must be able to be removed, on either a planned basis or for maintenance / replacement, without impacting the proper operation of the Data Centre facility.

M2.2 Fire Reticulation System
Single metered connection to each site / Tenant, separating into domestic and firefighting (fire appliance) systems. The fire fighting main is to be connected to a dual booster connection (accessible to the Fire Brigade at the site entrance) with external fire hydrants, including a connection to the building for the internal fire appliance reticulation, as required.

M2.3 Fire Appliances
Internal fire hydrants, fire hose reels and fire extinguishers are to be provided for a Building Occupancy :

- Offices - G1
- Data Centre Halls - D4
- Utility Rooms - D4
- Generator and Diesel Storage - D4 / J1

Additional fire appliance requirements for process areas to be catered for by the Tenant.

M2.4 Fire Detection
An analogue addressable fire detection system (Category L1) is to be provided within the facility in accordance with SANS 10139. The fire detection system shall meet the requirements of a Tier III Classification.

M2.5 Fire Suppression : Data Centre Halls / Utility Rooms / Meet-Me Room
An environmentally friendly 3 zone conventional fire suppression system (Category L1), for the total flooding within the respective rooms (fire suppression nozzles are to be placed within the room, hot aisles and within the floor voids), is to be provided in accordance with SANS 10139, SANS 246, SANS 369 and SANS 14520 as required.

It is intended that the Data Centre facility shall be awarded the Tier III Classification. This classification means "concurrently maintainable", i.e. it must be possible that each and every capacity component and distribution path servicing the Data Centre facility must be able to be removed, on either a planned basis or for maintenance / replacement, without impacting the proper operation of the Data Centre facility.

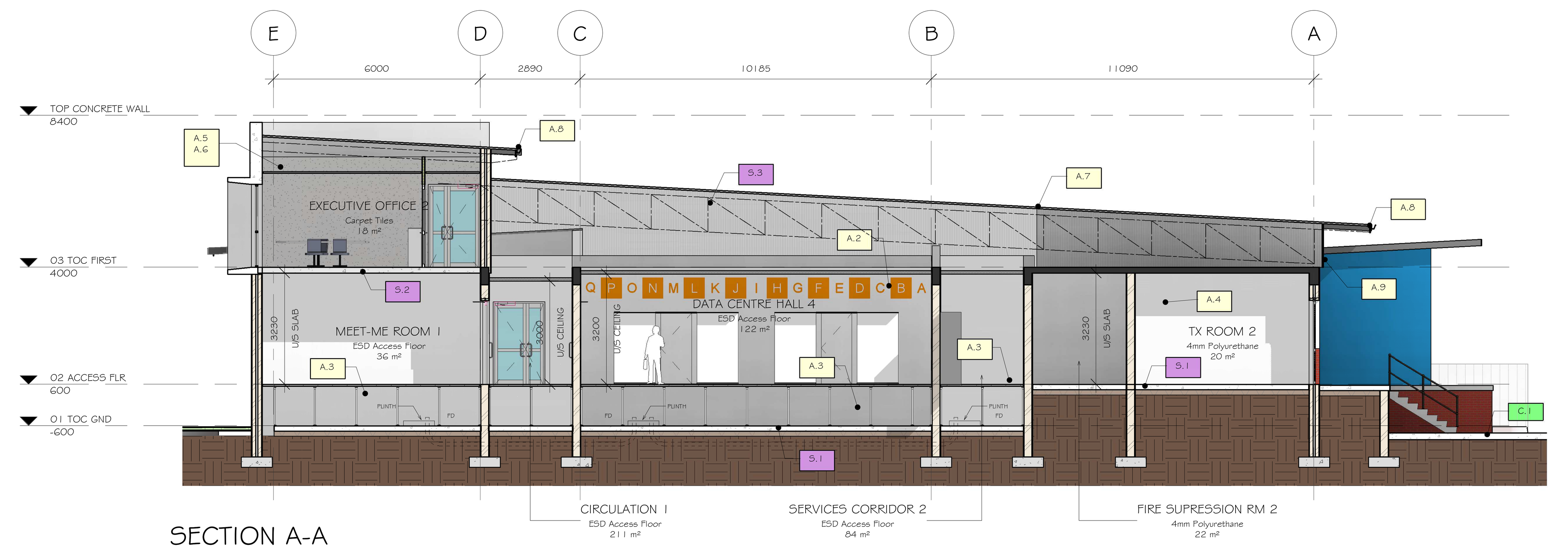
M.3 Ventilation

Ventilation in building will be provided in terms of the stipulated minimums in SANS 10400 "Part O" and the OHS Act under the Environmental Regulations for Workplaces.

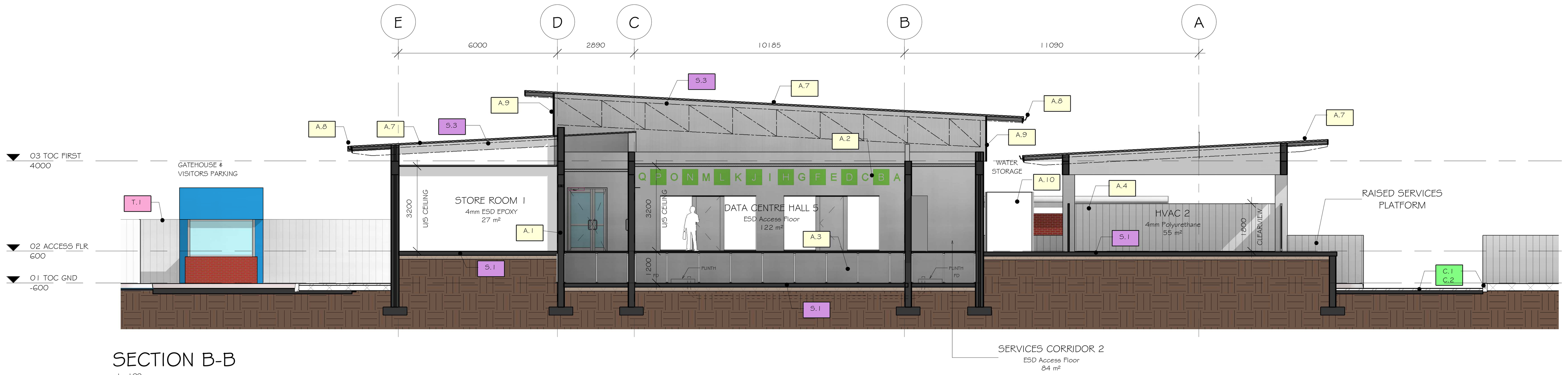
Air extraction systems will be provided for ablution facilities, canteens and tea kitchens in accordance with SANS 10400 "Part O".

Fresh air will be provided for all air-conditioned spaces in accordance with SANS 10400 "Part O".

Room areas are to be less than 500 m² to eliminate the need for smoke extraction, according to SANS 10400 "Part T".



SECTION A-A
1 : 100



SECTION B-B
1 : 100

E ELECTRICAL

E.1 Design Criteria and Parameters
The design criteria applied to the electrical engineering services shall include the following, namely :

- Capital costs
- Operational and maintenance requirements and costs
- Ease of functionality, operation and maintenance
- Compliance with general energy efficiency and / or sustainability standards

Furthermore, the electrical engineering services shall be designed in accordance with, but not limited to, the current versions of the following, namely :

- the South African National Standard : Code of Practice for "The Application of the National Building Regulations" i.e. those included in the "National Building Regulations and Building Standards Act, 1977 (Act 103 of 1977)", as published in the Government Gazette, number 31084, dated 30 May 2008, which became effective as of 01 October 2008, and known as "SANS 10400 - 2010"
- the Occupational Health and Safety Act, 1993 (Act 85 of 1993),
- SANS 204-1 : 2008 - Energy Efficiency in Buildings : Part 1 - General Requirements,
- SANS 204-2 : 2008 - Energy Efficiency in Buildings : Part 2 - The Application of the Energy Efficiency Requirements for Buildings with Natural Environmental Control,
- SANS 204-3 : 2008 - Energy Efficiency in Buildings : Part 3 - The Application of the Energy Efficiency Requirements for Buildings with Artificial Ventilation or Air-conditioning,
- any other relevant by-laws of the Local Authorities,
- SANS 507-1 : (NRS 034-1 : 2007) Electricity Distribution - Guidelines for the Provision of Electricity Distribution Networks in Residential Areas (Part 1 : Planning and Design of Distribution Networks)
- SANS 10114-1 : 2005 : Interior Lighting
- South African National Standard : SANS 10142-1: 2003 - The Wiring of Premises : Part 1 - Low-voltage Installations
- "SANS 0313 - 1999 : The Code of Practice for "The Protection of Structures against Lightning"

SANS 10139 : 2007 - Edition 3.1 - "Fire Detection and Alarm Installations for Buildings - System Design, Installation and Servicing", as amended

E.2 Accreditation / Classification
It is intended that the Data Centre facility shall be awarded the Tier III Classification. This classification means "concurrently maintainable", i.e. it must be possible that each and every capacity component and distribution path servicing the Data Centre facility must be able to be removed, on either a planned basis or for maintenance / replacement, without impacting the proper operation of the Data Centre facility.

E.3 Bulk Electricity Service Connection
It is anticipated that the Data Centre shall eventually require an 11 000 V, dual, redundant, ring-fed, 2.0 MVA bulk electricity service connection.

Although the medium voltage reticulation within the East London Industrial Development Zone has sufficient spare capacity to accommodate this project, an application shall still be submitted to the East London Industrial Development Zone for the necessary bulk electricity service connection, for record purposes.

The East London Industrial Development Zone shall not impose any electricity service connection fees and / or electricity account deposits on the project.

The project shall be responsible for the necessary medium voltage reticulation (2 off 11 kV cables installed in a ground trench) between the Data Centre and the existing medium voltage substation, known as "SS 1A4".

The Client / Employer, under a separate contract, shall extend the existing 11 kV switchboard within the "SS 1A4" medium voltage substation and prepare same to accept the medium voltage reticulation installed by the project, en route from the Data Centre.

The 11 kV switchboard shall be equipped with two 11000 V circuit breaker type feeder circuits for the purposes of providing the bulk electricity service connection to the Data Centre. These circuit breakers shall be equipped with all necessary metering and protection facilities as is required by the Client / Employer.

As is required by the desired Tier Certification and Accreditation, the Data Centre shall be serviced by means of a bulk electricity service connection which has a dual, redundant and ring-fed capacity and configuration.

Therefore, the medium voltage reticulation, as explained above, shall enter the Data Complex site at two differing positions, en route to the respective on-site medium voltage substations and provide an interconnection between the respective substations.

It is envisaged that the Data Complex shall be serviced by two off medium voltage substations, which shall be termed "Substation A" and "Substation B". These respective substations shall comprise separate medium voltage and transformer rooms.

The afore-mentioned anticipated bulk electricity service connection, and associated bulk electrical equipment, has been determined as follows :

- Electrical load drawn by data and associated equipment 1080 kW 1350 kVA
- Electrical load to be serviced by UPS system 1296 kW 1620 kVA
- Electrical load to be serviced by generator system 1555 kW 1944 kVA
- Size of transformer (as detailed below) 2000 kVA

However, in an effort to reduce the initial construction cost, the Client / Employer has indicated that the initial electrical demand may be deemed as follows :

- Electrical load drawn by data and associated equipment 360 kW 450 kVA
- Electrical load to be serviced by UPS system 432 kW 540 kVA
- Electrical load to be serviced by generator system 520 kW 648 kVA
- Size of transformer (as detailed below) 600 kVA

This project specification is based on the assumption that the anticipated bulk electricity service connection is to be provided. The Contractor is to construct the Data Centre, and all its utility rooms, as if the anticipated bulk electricity service connection is to be provided, but the Contractor is to equip the Data Centre with the bulk electrical equipment necessary for the initial (reduced) electrical demand. It is of utmost importance that the Contractor constructs the Data Centre facility in such a manner that the provided bulk electrical equipment can easily and practically be upgraded / replaced with the equipment necessary for the anticipated electrical demand, without any subsequent builder's Works.

Wherever possible, the bulk electrical equipment may be reduced in size and capacity, but the general characteristics and specifications thereof must remain as detailed herein.

It is anticipated that the initial electrical demand can be serviced by means of 11 kV / 420 V / 630 kVA miniature substations. Thus, reducing the necessity of medium voltage switchgear and medium voltage transformers. The Contractor is to consider this option and to prepare an alternative proposal on the basis thereof.

E.4 Medium Voltage Switchgear
The medium voltage switchgear shall comprise the following, namely :

- Substation A, housing a four panel 11 000 V switchboard (with one "incomer" panel, one "interconnection feeder circuit en route to Substation B" panel, one "transformer feeder" panel and one "voltage transformer" panel)
- Substation B, housing a four panel 11 000 V switchboard (with one "incomer" panel, one "interconnection feeder circuit en route to Substation A" panel, one "transformer feeder" panel and one "voltage transformer" panel)
- All medium voltage equipment fed, and inter-connected, by a dual, redundant and ring-fed medium voltage cable network

E.5 Medium Voltage Transformers
The medium voltage transformers shall comprise the following, namely :

- Transformer A, SANS 780, 11 kV / 420 V, 2000 kVA, Dyn11, Copper
- Transformer B, SANS 780, 11 kV / 420 V, 2000 kVA, Dyn11, Copper
- Transformers A and B will be connected to the same medium and low voltage network, with possible interconnection and therefore, are to be identical w.r.t. physical and electrical characteristics.

E.6 Medium Voltage Cables
All single core and three core cables with stranded copper conductors and insulated with cross linked polyethylene, shall comply with SANS 1339.

Conductors shall comprise standard annealed copper, complying with the requirements for class 2 conductors in SANS 1411-1.

All single core cables shall comply with the requirements given in tables 11, 12 and 13 of SANS 1339:1981.

All three core cables shall comply with the requirements given in tables 23, 25 and 26 of SANS 1339:1981 for type A cable and tables 29, 31, 32 and 33 for type B cables.

E.7 Low Voltage Reticulation
The low voltage reticulation shall comprise the following, namely :

- Main Low Voltage Panel, termed MLVP A, housed within LV Room A
- Main Low Voltage Panel, termed MLVP B, housed within LV Room B
- A series of electrical distribution boards throughout the Data Centre (note : all electrical distribution boards and associated low voltage cables necessary for the User's internal electrical installation shall be provided under this contract)
- All main low voltage panels and respective electrical distribution bards shall be inter-connected by a low voltage cable network

Electricity feeder cables shall be Cu PVC PVC SWA ECC PVC cables, with stranded conductors.

All main low voltage panels and electrical distribution boards are to be manufactured by a reputable company, with relevant experience in the manufacturing of low voltage panels, electrical distribution boards, control panels, etc.

E.8 Builder's and related Works, Trench Excavations, Brick-built Enclosures (Manholes), Ducts
The Contractor shall be responsible for the necessary co-ordination and timing of the builder's and related Works pertaining to this Contract.

All Utility Rooms shall be constructed with the necessary floor trenches for the installation of all associated electrical services.

The Contractor shall undertake all trench excavations, including backfilling and compaction, required for the electrical installation.

The Contractor shall be responsible for the provision of the brick-built enclosures (manholes).

The Contractor shall be responsible for the provision of all ducts necessary for the electrical and, telecommunications and associated installations. In summary, ducts shall be installed beneath (across) all walkways, driveways, and finished surfaces.

The ducts shall be manufactured from a high-density polyethylene with a double wall construction, allowing a corrugated outer wall finish and a smooth inner wall finish, and of the internal diameters as indicated on the attached drawings.

All ducts shall be minimum 160 mm outer diameter, with minimum 137 mm internal diameter.

E.9 Generator
The Contractor shall provide an open set-type, diesel-driven generator set, complete with automatic mains failure facilities, controller, change-over and protection switchgear, base-mounted fuel tank and GSM (global system for monitoring via mobile phones) alarm system.

E.10 Uninterruptible Power Supply Unit
The Contractor shall provide a highly efficient, scalable, three phase power protection unit with flexible operating modes suitable for Data Centre facilities, as manufactured by Schneider Electric. The unit provided shall, as a minimum, meet the specification of the Schneider Electric 500 kW to 1500 kW, Galaxy VX product range.

E.11 Conduit and Conduit Accessories
All flush-mounted conduit and conduit accessories shall be PVC conduit in accordance with SANS 950.

All surface-mounted conduit and conduit accessories shall be galvanised conduit type, and manufactured in accordance with SANS 162, 763 and 1007 respectively.
All exposed conduit and conduit accessories shall be galvanised, powder coated, orange.

E.12 Conductors
All low voltage single core conductors shall be of the PVC insulated type with stranded copper conductors, rated at 600 V general service duty and manufactured in accordance with SANS 1507 - 1990.

E.13 Lighting Installation
A lighting installation, in accordance with the relevant regulations, which will ensure the efficient and proper usage of all spaces throughout the new buildings, shall be provided.

All luminaires specified shall be fitted with light emitting diode-type lamps.

The lighting design calculations shall be based on achieving the minimum lighting levels, in accordance with the relevant South African National Standards documentation, as follows :

•	Manufacturing	-	General Working Areas (*)	-	350 lux
•	Administrative Buildings	-	Entrance Halls	-	100 lux
•		-	Reception Areas	-	100 lux
•		-	Board rooms, offices	-	300 lux
•		-	Computer rooms	-	500 lux
•	Maintenance Buildings	-	General	-	300 lux

The lighting design shall (where applicable) take into account and include the following, namely :

- Specified luminaires shall provide high levels of luminous flux and be fitted with electronic control gear
- Specified lamps shall provide the correct colour rendering for the application and use energy efficient lamps i.e. light emitting diode (LED) type
- Maximum natural daylight usage and controllable light levels
- Task specific light sources
- Multiple control for light circuits / zones covering areas greater than 100 m²

Emergency exit signage and route lighting shall be provided for any evacuation procedures that could occur.

Allowances shall be made for decorative post-top type luminaires, with light emitting diode type lamps, on fibreglass poles to be installed throughout the complex including along all walkways, roadways and parking areas.

The luminaires shall comply with the specification detailed in the Project Specification.

E.14 Small and Large Power
Generally, power shall be provided to the various areas by means of switched socket outlets.

The layout and quantity of the switched socket outlets shall be determined by the use of the specific room, the equipment to be installed therein and the services / activities to be rendered from there.

Switched socket outlets shall be provided approximately every 10 m² in all passages and public areas for cleaning and maintenance purposes.

Should the activity or specific equipment require, i.e. within the kitchen areas, the power supply provided shall be in the form of a switched isolator.
As the design responsibility ends at the switched socket outlet or isolator points, we cannot guarantee what the End User is going to connect to the installation. Therefore, it is only possible to encourage (and not guarantee) energy savings at switched socket outlet and isolator points.

E.15 Power Skirting Installation / Flush-floor or Under-screed Ducting Installation
The power skirting, where applicable, shall be O-Line Premier Skirt PM2, a fully modular system, manufactured from self-extinguishing polycarbonate, with a white finish white in colour, complete with all necessary accessories, corner pieces, covers, dividers, elbows, end caps, joint clips, outlet clips, tee pieces, etc.

Where applicable, the flush-floor ducting and under-screed ducting systems shall be fully modular, manufactured from pre-galvanised steel (grade Z275), as manufactured by Cabstrut.

E.16 Cable Support Systems
Cable Ladder
Where applicable, the cable ladder shall be manufactured from pre-galvanised steel (grade Z275), as manufactured by Cabstrut or O-Line. The cable ladder shall be of a weld-free construction, allowing fitment on site. No alternatives shall be accepted.

Cable Tray
Where applicable, the cable tray shall be manufactured from pre-galvanised steel (grade Z275), as manufactured by Cabstrut or O-Line. The cable tray shall be of an inward bend return flange construction, allowing the use of thinner gauge materials, without compromising loading or deflection standards. No alternatives shall be accepted.

General
All exposed cable support systems shall be powder coated, orange.

E.17 Wiring Duct Installation / Wiring Mesh Installation
Where applicable, the wiring duct shall be manufactured from pre-galvanised steel (grade Z275), as manufactured by Cabstrut or O-Line.

Where applicable, the wiring mesh shall be manufactured from pre-galvanised steel (grade Z275), as manufactured by Cabstrut or O-Line.

All exposed wiring duct / wiring mesh shall be powder coated, orange.

E.18 Earthing (Bonding), Specialist Earthing, Surge Protection and Lightning Protection Systems
Earthing (Bonding) System
The Contractor shall be responsible for the supply and installation of the required earthing (bonding) system.

Specialist Earthing
The Contractor shall be responsible for the supply and installation of the specialist earthing system.

The earth resistance of the respective earth bars, earth mats and earth star systems shall not exceed 30 ohms and shall be supplemented as necessary with driven molecular bonded copper clad steel rods manufactured to SANS 0163 - 1985.

Separate earth mats / systems shall be provided for the following facilities / areas, (where applicable), namely :

- Substations, Medium Voltage Switch Rooms, Transformer Rooms, Low Voltage Switch Rooms, Generator Installations
- Uninterruptible Power Supply Installations, etc.
- Telecommunications / Data Server Rooms / Data Centre Halls

Surge Protection System
The Contractor shall be responsible for the supply and installation of the required surge protection equipment.

All low voltage panels and electrical distribution boards are to be fitted with surge protection, as is required by the relevant regulations.

Lightning Protection System
The Contractor shall be responsible for the supply and installation of the required lightning protection system, protecting all buildings within the Data Centre.

The lightning protection system shall be installed in accordance with the relevant South African National Standards documentation and shall comprise (per building) :

- An air termination system installed on all parapet walls / exposed elements
- A down-conductor system installed within wall cavities, or surface mounted, whichever is necessary
- A down-conductor bonded to earth termination system
- Ground earth electrodes
- An earth termination system

E.19 Staff Training
The Contractor shall provide comprehensive training of male and female operational staff and nominated maintenance personnel, to the approval of the Client / Employer. Training shall be comprehensive, covering all aspects of systems installed as part of these Works.

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No	Date	Revision Description	By
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Project
PROPOSED DATA CENTRE ON ERF 60917

Drawing Title
CARTOON SECTION
PROPOSED DESIGN LOADS, SERVICES AND FINISHES

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		Approved	WM

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