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Compiled by	Functional Responsibility	Authorised by
BW Thomas		
Byron Thomas	**Palesa Moleko**	**Tshepo Phiri**
Engineer	**Project Manager**	**Program Manager** Acting
Eskom Real Estate	**Eskom Real Estate**	**Eskom Real Estate**
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CONTENTS

Page

1. INTRODUCTION 3

2. SUPPORTING CLAUSES 3

2.1 SCOPE 3
2.1.1 Purpose 3
2.1.2 Applicability 3
2.2 NORMATIVE/INFORMATIVE REFERENCES 3
2.2.1 Normative 4
2.2.2 Informative 4
2.2.3 Disclosure Classification 4
2.3 ABBREVIATIONS 4
2.4 ROLES AND RESPONSIBILITIES 4
2.5 PROCESS FOR MONITORING 5
2.6 RELATED/SUPPORTING DOCUMENTS 5

3. ENGINEERING AND THE *CONTRACTOR'S* DESIGN 5

3.1 DESCRIPTION OF THE *WORKS* 5
3.1.1 Existing System 5
3.1.2 Works to be performed by the *Contractor* 5
3.2 *EMPLOYER'S* DESIGN REQUIREMENTS 6
3.3 *CONTRACTOR'S* DESIGN 6
3.3.1 General 6
3.3.2 Civil and Structural Scope 7
3.3.3 Roads scope 8
3.3.4 Architectural scope 10
3.3.5 Electrical and Lighting Scope 10
3.4 OTHER REQUIREMENTS OF THE *CONTRACTOR'S* DESIGN 14
3.4.1 Documentation and Configuration Management 14

4. CONSTRUCTION 17

4.1 GENERAL 17
4.2 CONSTRUCTION AND ERECTION 18
4.3 QUALITY MANAGEMENT 18
4.4 HANDOVER 18

5. SPECIFICATIONS FOR THE *WORKS* 19

5.1 APPLICABLE NATIONAL STANDARDS 19
5.2 ADDITIONAL REQUIREMENTS AND PREREQUISITES 20
5.2.1 General 20

6. INFORMATION ISSUED BY THE *EMPLOYER* 20

7. AUTHORISATION 20

8. REVISIONS 21

9. DEVELOPMENT TEAM 21

10. CONCEPT LAYOUT 22

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1. INTRODUCTION

The Refuse Warehouse area within Eskom academy of Learning (EAL) requires refurbishment to be in line with current operations and regulatory standards.

This Technical Specification was developed to allow the client to appoint a contractor to conduct the required works.

2. SUPPORTING CLAUSES

2.1 SCOPE

This document covers the minimum technical specification for the scope of the *works* based on the following:

- High Level Scope
  - Conduct site investigations
  - Develop a detailed design, construction drawings, as built drawings
  - Extension of the existing structure to include a pause area, ablutions and change rooms as per attached Architect's design
  - Remedial works on the existing warehouse ground slab
  - Investigate the leaks on the existing roof, seal all roof leaks, and make good (paint) the existing steel structure
  - Construction of 2 wash bay areas for the cleaning of bins and fleet vehicles
  - Redo of paving and drainage philosophy for the area with the inclusion of an oil trap prior to discharge into the storm water system
  - Construction of an Entrance Road, refurbishment and realignment of the road to maximise area for operations
  - Fabrication and installation of new bin supports
  - Enclosing of the area with fencing and access gates
  - The creation of demarcated recycling area as per the clients requirements
  - Site clearing, levelling and compacting
  - Conduct execution, testing commissioning and hand over activities
  - The separation of potable and fire water (Supply to be completed by others, in future projects)

2.1.1 Purpose

The purpose of this document is to outline the minimum scope of work technical specifications for the *works*. This document provides the Engineering input to be included in a Contract document based on the New Engineering Contract (NEC) conditions of contract.

2.1.2 Applicability

This document applies to EAL Refurbishment of the Refuse Warehouse Project only.

2.2 NORMATIVE/INFORMATIVE REFERENCES

Parties using this document apply the most recent edition of the documents listed in the following paragraphs.

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2.2.1 Normative

[1] ISO 9001 Quality Management Systems.

[2] Construction Regulations, 2014

[3] 32-727 - Eskom Safety, Health, Environment and Quality (SHEQ) Policy

[4] Occupational Health and Safety Act No. 85 of 1993,

2.2.2 Informative

[5] 240-53113685, Design Review Procedure

[6] 240-53114186, Document and Record Management Procedure

2.2.3 Disclosure Classification

Controlled disclosure: controlled disclosure to external parties (either enforced by law, or discretionary).

2.3 ABBREVIATIONS

Abbreviation	Description
EAL	Eskom Academy of Learning
ECSA	Engineering Council of South Africa
GA	General Arrangement
NEC	New Engineering Contract
SANS	South African National Standards

2.4 ROLES AND RESPONSIBILITIES

Contracts Manager: The contracts manager is responsible for the incorporation of this Technical Specification into a contract based on the NEC conditions of contract.

Engineering Practitioner: The Engineering Practitioners are responsible for the review of the completed contract to ensure that this Technical Specification has been incorporated correctly.

Architectural Practitioner:

The Architectural Practitioners are responsible to review the completed contract to ensure that this Technical Specification has been incorporated correctly.

Project Manager:

The project manager is responsible for facilitating and ensuring continuous coordination and management of the requirements during the design development, execution phase and closing out of the project.

Facilities Manager:

The facilities manager is responsible for ensuring continuous sustainable performance of facilities. During construction phase he/she ensures that there is smooth interactions with tenants and stakeholders where required.

Contractor:

The contractor's responsibility is to build the project according to the contract documentation within the required cost and time budgets and the specified standards.

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2.5 PROCESS FOR MONITORING

The design aspects will be monitored by conducting end of phase design reviews as described in the Eskom design review procedure [5]

2.6 RELATED/SUPPORTING DOCUMENTS

None.

3. ENGINEERING AND THE *CONTRACTOR'S* DESIGN

3.1 DESCRIPTION OF THE *WORKS*

3.1.1 Existing System



Figure 1: Showing the Refuse Warehouse area

As shown in Figure 1, the site is located within EAL, there exists a partial fencing around the boundary of the area, as well as road access, water supply and an existing steel structure.

3.1.2 Works to be performed by the *Contractor*

a) The *Contractor* conducts the required site assessments such as ground conditions, locating underground services (infrastructure for the storm water, electrical supply, sewage etc.) to complete the detailed design.

b) The *Contractor* conducts all other assessments deemed necessary for the execution of the new ablution addition.

c) The *Contractor* develops detailed design and construction drawings in accordance with the *Employers* concept information, Specifications and Standards.

d) The construction is completed in accordance with the *Contractor's* accepted detailed design

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e) The *Contractor* provides a methodology and schedule for the execution of the *works*.

f) The *Contractor* provides a cost for the full execution of the *works*.

g) The *Contractor* is responsible for obtaining any permission, approval, concession, permit or licence required prior to commencement of the *works*

3.2 *EMPLOYER'S* DESIGN REQUIREMENTS

a) All *work* are in accordance with the following *Employer's* Design Standard:

- 240-56364545 – Structural Design and Engineering Standard
- 240-56364535 – Architectural Design and Green Building Compliance Manual
- 240-85549846 – Standard for Design of Drainage and Sewerage Infrastructure
- 240-84418186 – Road Specification Manual
- 240-57127953 – Execution of Site Preparation and Earthworks Standard

b) All designs produced are reviewed for acceptance by the *Employer* as per the Eskom design review procedure [5]. Acceptance of the design by the *Employer* does not release the *Contractor* from design liability. The *Contractor* Submits a design report that, as a minimum, includes assumptions, detailed calculations, analysis, results, etc.

3.3 *CONTRACTOR'S* DESIGN

3.3.1 General

a) Design, engineering, manufacture, quality control, procurement, handling, shipment and transport to/from site, storage, offloading, construction and erection, painting and finishing, installation, commissioning, testing and handover of equipment, tools and materials for the remedial works related to the EAL Refurbishment of the Refuse Warehouse Project.

b) The *Contractor* designs, constructs and erects the *works* in accordance with the *Contractor's* accepted design and takes cognisance of SANS 2001, SANS 10400 and SANS 1200.

c) The works are designed for constructability, reliability, and maintainability.

d) The *Contractor* procures all construction material and equipment required to perform the *works*.

e) The *Contractor* identifies and includes all items required to form a complete, reliable, fit for purpose operating *works*, which complies with the requirements as stipulated in this Works Information.

f) The *Contractor* provides all engineering calculations, drawings (hard and soft copy) models, inspection/quality reports, construction records, commissioning test reports, and other documentation as required by the scope of works.

g) The *Contractor* provides dimensioned general arrangement drawings of the designed *works* and detailed drawings of all components of the *works*, sufficiently detailed for the preparation of maintenance and operating procedures.

h) The *Contractor* supplies drawings and documentation as specified in the Works Information. This includes, but is not limited to, GA drawings, fabrication drawings, construction drawings, as built drawings, maintenance and operating manuals for the fabrication and installation of the *works*.

i) The *Contractor's appointed professional engineer* provides technical oversight during fabrication and construction.

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j) Other Plant and Materials or items associated with this *works* is utilised with prior approval from the *Project Manager*.

k) The *Contractor* performs Factory Acceptance Testing (FAT) and Site Acceptance Testing (SAT) of the Plant and Materials.

l) The *Contractor* designs and provides all falsework and formwork and any other necessary temporary works for the safe execution of the *works*.

m) Prior to the execution of the *works*, all design documentation and detailed method statements from the *Contractor* are to be submitted to the *Project Manager* for review and acceptance by the *Employer's* design office.

3.3.2 Civil and Structural Scope

The *Contractor* develops a detailed design based on the concept layout (Appendix A) provided by the *Employer*. The Civil Scope includes the following:

- conducts remedial works on the ground slab of the steel structure with a durable slopped screed/ structural topping to allow for adequate drainage during floor washing
- fabricate and install of durable steel frame for the support of waste separation bags
- extending of the existing structure to allow for the creation of a pause area, ablutions and change room facility
- assessment and survey of the existing paved area in terms of drainage philosophy, the installation of an oil trap,
- survey and refurbishment of the existing entry road, realignment of the existing road area to maximise operations area and allow water runoff, installation of access gates, refurbishment of the existing paved area, ensure adequate drainage
- construction of 2 wash bay areas to allow for the washing of fleet vehicles and bins
- fencing and enclosing the Refuse Warehouse area
- creating demarcated recycling areas as needed for operations
- assessment and support solution to be provided for the embankment/step along the north east end of the warehouse

Prior to the execution of the *works*, all design documentation and detailed method statements from the *Contractor* are to be submitted to the *Project Manager* for review and acceptance by the *Employer's* design office.

The *works* comply with and not limited to the codes and standards indicated in section 3.2 along with the following:

- SANS 10100-1,The Structural Use Of Concrete Part 1 – Design
- SANS 10100-2,The Structural Use Of Concrete Part 2 – Materials and execution of work
- SANS 10160, Basis of structural design and actions for buildings and industrial structures
- SANS 10162-1, The structural use of steel Part 1: Limit-states design of hot-rolled steelwork
- SANS 10162-2, The structural use of steel Part 2: Cold-formed steel structures
- SANS 10400, The application of the National Building Regulations

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- SANS 1200 Series, Standardised specification for civil engineering construction
- SANS 2001 Series, Construction Works
- TMH Series, Technical Methods for Highways
- TRH series, Technical Recommendations for Highways
- UTG series, Urban Transport Guidelines
- AASHTO, American Associates of State Highways and Transport Officials

3.3.3 Roads scope

- The Roads Scope includes the following:
- Reinstate the existing road to a functional level with the required layerworks, paving and drainage.
- Survey of existing roadway to be used for design and drainage
- Design of layerworks and geometrics based on the expected loading and lifespan (E80s)
- Confirm the in-situ material and suitability for re-use through geotechnical sample and testing.
- Tie-in to existing drainage infrastructure
- All tests and recommendations are to be provided to the client.

Details of the existing road:

- Length of road = 55m, and 4m wide
- Visible drainage issues and the corrugated layers have developed pot holes / inundations.
- Drainage channel exists at the main tarred road.

A typical re-instatement subject to re-design could include:

- Re-instating what looked like block paving, using in-situ some of the material or blended it to create a usable material. Eg) G4 or C4
- Concrete V-drains or kerb to ensure run-off into the stormwater drainage.

Below is an example of a typical cross section that could work and a kerbing solution.

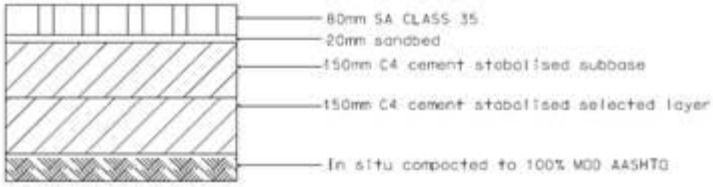

Figure 2: Design layerworks

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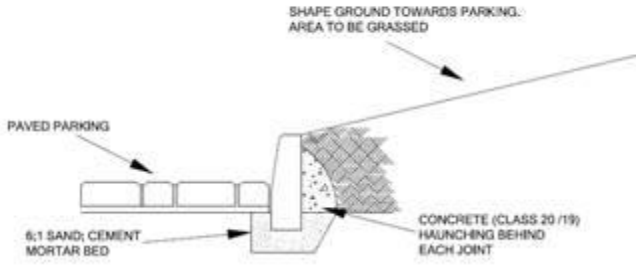

Current conditions of the road are seen below:





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3.3.4 Architectural scope

The *Contractor* develops a detailed design based on the concept layout provided by the *Employer*. The Architectural Scope includes the following:

- conditional assessment of the existing building and recommendations for remedial actions
- resurfacing of the floor in the existing building and finish with epoxy as per layout provided by the Employer
- construction of the new ablutions block as per details approved by the Employer
- construction of the new washbay, new bin-washbay and horticulture refuse area as per details approved by the *Employer*
- connection of all services to the new addition
- obtaining all necessary approvals (including Municipal approval etc.)

3.3.5 Electrical and Lighting Scope

This section covers the supply, installation and connecting of luminaires and switches for lighting installations in buildings or other structures.

The electrical *Contractor* only commences with the installation of luminaires after the paintwork in the vicinity of the fitting is complete and dry. Care is taken to ensure that paintwork is not damaged during the installation of light fittings.

The type of luminaires to be used are indicated and specified on both the relevant drawing as well as in the detail specification.

a. Conduit

Wherever possible, the conduit installation is concealed in the building work. Conduit installed on the surface is plumbed or levelled and only straight lengths is used.

The use of inspection bends will be avoided and instead the conduit will be set uniformly and inspection coupling used where necessary.

No threads will be permitted to show when the conduit installation is complete, except where running couplings have been employed.

Running couplings are only to be used where unavoidable, and is fitted with sliced couplings as a lock nut.

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Conduit is to be run on approved spaced saddles mechanically secured to the walls.

Alternatively, fittings, tees, boxes, couplings etc., are to be cut into the surface to allow the conduit to fit flush against the surface. Conduit to be bedded into any wall irregularities to avoid gaps between the surface and the conduit.

Crossing of conduits is to be avoided; however, should it be necessary purpose-made metal boxes are to be provided at the junction. The finish of the boxes and positioning to be in keeping with the general layout.

Where several conduits are installed side by side, they shall be evenly spaced and grouped under one saddle.

Distribution boards, industrial switches and socket outlets etc., to be neatly recessed into the surface to avoid double sets.

In situations where there are no ceilings, the conduits to be run along the wall plates and the beams.

Painting of surface conduit to match the colour of the adjacent wall finishes.

Only approved plugging materials such as aluminium inserts, fibre plugs, plastic plugs, etc., and round-head screws shall be used for fixing saddles, switches, socket outlets, etc., to walls. The use of wood plugs and the plugging in joints in brick walls shall not be allowed.

b. Wiring

Wiring to be carried out in conduit and electrical trunking. Only one circuit per conduit to be allowed.

No wiring to be drawn into conduit until the conduit installation has been completed and all conduit ends provided with bushes. All conduits to be clear of moisture and debris before any wiring is commenced.

The wiring of the installation to be carried out in accordance with the SANS 10142-1. Further to the requirements concerning the installation of earth conductors to certain light points as set out in the SANS 10142-1, it is a specific requirement of this document that where plain-end metallic conduit has been used, earth conductors must be provided and drawn into the conduit with the main conductors to all points, including all luminaires and switches throughout the installation.

The *Contractor* to calculate sizing of wires or cables for voltage drop compliance using the equipment starting currents. The maximum volt drop of 5% to be used from the distribution board to the furthest light on the circuit. The maximum number of luminaires allowed is not to exceed the load capacity of the conductors. In certain instances, due to the long runs, the sizes of the aforementioned conductors may be increased for specified circuits. Sizes of conductors to be drawn into conduit in all other instances, such as feeders to distribution boards, power points etc., to be as specified elsewhere in this specification or indicated on the drawings. Sizes of conductors not specified must be determined in accordance with the SANS 10142-1.

The loop-in system to be followed throughout, joints of any description is not be allowed.

The wiring is to be done in Surfix or PVC insulated 600/1000V grade cable to SANS 1574-2.

Where cable ends connect onto switches, luminaires etc., the end strands must be neatly and tightly twisted together and firmly secured. Cutting away of wire strands of any cable is not be allowed.

All wiring for the lighting circuits to minimum of 2.5mm and for socket outlet circuits 4mm.

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c. Power Trunking

The *Contractor* is responsible for the supply and installation of all power trunking complete with corner pieces, end pieces, junction pieces, supply conduits, cover plates and power outlets as specified and indicated on the design drawings.

The power trunking complies with SANS 61084-1. The *Contractor* ensures that the power trunking is installed to satisfaction of the *Employer* before commencing with the wiring of the power trunking.

Install P1001-D trunking from wall to wall for supporting the light fittings in the refuse house. The trucking height to be 6.5m.

Install P1000 trunking from wall to wall from supporting the light fittings in the WashBay. The trunking to be mounted on the underside of the roof truss.

d. Distribution Boards

All boards shall be in accordance with the types as specified, be constructed according to the detail or type drawings and must be approved by the *Employer* before installation.

Any construction or standard type of a distribution board proposed, as an alternative to that specified must have the prior approval of the *Employer*.

All incomer breakers on three phase distribution boards shall be rated a minimum of 32A with a minimum fault current level of 10kA.

The distribution boards shall be constructed in such a way that it will be capable of withstanding all the mechanical, electrical and thermal stresses as well as the effects of dust ingress and humidity which will be encountered during normal operation. The minimum thickness for the plate steel shall be 1.6mm. Cubicle doors shall be positively drawn closed onto seals by means of padlock-lockable lever operated catches. Perforated foam type seals shall not be provided. The distribution board shall be provided with an internal equipment cover plate in accordance with SANS 10142-1. The cover plates shall not be used to keep components in position. The cover plates shall be provided with hinges for opening/closing and shall be provided with a square key lock.

Finishing colour shall be to SANS 1091 “Light Orange” and “Signal Red” for a normal and essential 230/400V distribution boards for.

The distribution boards utilised outdoors shall be IP65 rated and for indoor IP55 rated. Distribution boards installed in Hazardous Locations shall conform to the requirements of SANS 10108.The distribution board circuit design shall be such that the load distribution between the phases is even (within 10%). This requirement shall also be considered when additional lights are installed.

All bus-bars, wiring, terminals, etc., are to be adequately insulated and supported for fault current forces. All wiring is to enter the distribution board from the bottom or top of the board. The circuit breaker shall be mounted within the distribution boards to give a flush front panel. Cable and boxes and other ancillary equipment must be provided as shown on the drawing.

Clearly engraved labels shall be mounted on or below every switch. The wording of the labels in English, is as directed by the *Employer’s* representative and must be confirmed on site. Flush mounted boards shall be installed with the top of the board 2,0m above the finished floor level.

The existing Kiosk supplying the Refuse Warehouse to be relocated by *others*. The *Contractor* makes provision to size, supply, and connect power cables (estimated length 70m) from the Refuse Warehouse Kiosk to the Refuse Warehouse Distribution Boards. This shall be done in compliance with SANS 10142-1 (The Wiring of Premises - Part 1: Low-voltage Installations). The Contractor shall ensure that all safety regulations and measures are applied and enforced

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during construction, repair and maintenance work on cabling, wiring, distribution boards, luminaires and power outlets

e. Certificate of Compliance

On completion of the installation, an Electrical Certificate of Compliance (CoC) as per SANS 10142-1 must be issued to the *Employer* in terms of the Occupational Health and Safety Act, (OHS Act 85 of 1993).

The qualified Contractor's Occupational Hygienist shall performed illumination measurements as recommended in SANS 10114 -1. Illumination measurement reports shall be produced and submitted to the *Employer*. Measurements shall be performed once the installation has been completed. Areas shall be re-checked periodically depending on the type of area and the type of lamps used (one year for fluorescent type lamps and two years for discharge type lamps).

f. Mounting and Positioning of Luminaires

The layout of the luminaires as indicated on the design drawings must be adhered to as far as possible and must be confirmed with the Employer's representative.

g. Earthing Installation

This section covers uncoated, coated and metal clad circular rod electrodes intended to provide an earth in soil for electrical and lightning arrestor systems. The earthing design be carried out by an Earthing Specialist and shall comply with the SANS 10142-1

Depending on the type of soil, the following type of earth rods shall be used:

- Solid copper;
- Solid stainless steel;
- Solid steel with bonded copper protection;
- Solid steel with plated copper protection;
- Solid steel with a shrunk-on copper jacket;
- Solid steel with a shrunk-on stainless steel jacket; and
- Galvanised steel.

Bare aluminium is not acceptable as an electrode material.

All rods shall be solid and of circular cross section manufacturer from materials and with lengths as specified in the detail technical specification by the Earthing Specialist.

The nominal diameter of the earthing rods shall not be less than 16mm unless the rods are specified for placing in pre-drilled holes in which event the minimum nominal diameter shall not be less than 12mm.

Earthing electrodes shall be provided with (n-1) couplings where n = number of rods supplied.

Rods designed for coupling by means of external sleeves shall be provided with an adequate quantity of hydrocarbon or silicon grease to be applied to the coupling before the joint is made.

Rods designed for coupling by means of internal pins or splines shall be provided with thin-walled tubes and hydrocarbon or silicon grease to seal the joint.

Conductor clamps shall be provided to suit the type and size of rods provided and the type and size of conductor.

The material of the clamps shall be electrolytic compatible with the rod and conductor materials.

Where brazed or welded connections are specified, the supplier of the rods shall stipulate at least two types of metals which are compatible with the rod and conductor materials.

An adequate number of driving caps or bolts shall be supplied with the rods to protect the ends of the earthing rods whilst being driven into hard soil.

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The type of main earthing must be as required by the *Employer*, and as directed by the Employer's representative, who may require additional earthing to meet test standards.

Eathing of specialised equipment is not covered in this standard.

Where required an earth mat shall be provided, the minimum size, unless otherwise specified, being 1.0m x 1.0m and consisting of 4mm diameter hard-drawn bare copper wires at 250mm centres, brazed at all intersections.

Alternatively or additionally earth rods or trench earths may be required as specified or directed by the Employer's authorised representative.

Installation shall be effectively earthed in accordance with the SANS 10142-1, Eskom Earthing Standard 0.54/393 and to the requirements of the supply authority. All earth conductors shall be stranded copper with or without green PVC installation.

A separate earth connection shall be supplied between the earth bus-bar in each sub-distribution board and the earth bus-bar in the main distribution board. These connections shall consist of a bare or insulated stranded copper conductor installed along the same routes as the power supply cables or in the same conduit as the supply conductors. Alternatively armoured cables with earth continuity conductors included in the armouring may be utilised where specified or approved.

The earth conductors of all sub-circuits shall be connected to the earth bus-bar in the supply distribution board in accordance with SANS 10142-1.

Common earth conductors may be used where various circuits are installed in the same wire way in accordance with SANS 10142-1. In such instances the sizes of earth conductors shall be equivalent to that of the largest current carrying conductor installed in the wire way, alternatively the size of the conductor shall be as directed by the *Employer*. Earth conductors for individual circuits branching from the ring main shall by connected to the common earth conductor with T-ferrules or soldered. The common earth conductor shall not be broken.

Standard copper earth conductors shall be installed in the conduits and fixed securely to all metal appliances and equipment, including metal switch boxes, socket-outlet boxes, draw-boxes, distribution boards, luminaires, etc. The securing of earth conductors by means of self-threading screws shall not be allowed.

An earth conductor shall be installed in all non-metal flexible conduits. This earth conductor shall not be installed externally to the flexible conduit but within the conduit with the other conductors. The earth conductor shall be connected to the earth terminals at both ends of the circuit.

Under no circumstances shall any connection points, bolts, screws, etc., used for earthing be utilised for any other purpose. It will be the responsibility of the *Contractor* to supply and fit earth terminals or clamps on equipment and materials that must be earthed where these are not provided.

3.4 OTHER REQUIREMENTS OF THE *CONTRACTOR'S* DESIGN

3.4.1 Documentation and Configuration Management

The Contractor supplies a comprehensive configuration management program according to ISO 10007 (2nd Edition) to ensure that plant structures, components and computer software conform to approved design requirements. The configuration program shall be applicable for use throughout all phases of the project life cycle, including management of spare parts, replacement parts and product upgrades, and shall form part of deliverables for hand-over to the Employer for use during the operation and maintenance phases of the plant.

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3.4.1.1 Document identification

All documents supplied by the *Contractor* are subject to the *Employer's* acceptance. The language of all documentation is in English. The *Contractor* includes the *Employer's* drawing number in the drawing title block. This requirement only applies to design drawings developed by the *Contractor* and his Sub-Contractors. Drawing numbers are assigned by the *Employer* as drawings are developed.

The *Contractor* is required to submit a programme of work as per agreed dates to the delegated *Employer's* Representative. The *Employer* pre-allocates document numbers on the programme and sends back to the *Contractor* through the delegated *Employer's* Representative. The programme is revisable and changes are discussed and agreed upon by all parties. The *Contractor's* programme indicates the format of documents submitted.

3.4.1.2 Document Handover

All project documents are submitted to the delegated *Employer's* Representative with transmittal note according to the Project / Plant Specific Technical Documents and Records Management Work Instruction (240-76992014). In order to portray a consistent image it is important that all documents used within the project follow the same standards of layout, style and formatting as described in the Work Instruction.

The *Contractor* is required to submit documents as hard copies and electronic copies in PDF and native CAD formats (.DGN or .DWG which must be compatible with Bentley Microstation). Both copies must be delivered to the *Employer's* Representative with a transmittal note.

3.4.1.3 Email Subject

The *Contractor* submits all documentation to the *Employer's* Representative in the following media:

- Electronic copies are submitted to Eskom Documentation Centre through generic email address (drmsharedservices@eskom.co.za). The email subject as a minimum has the following: (Station_Project Name_Discipline_Subject). Electronic copies that are too large for email are delivered on USB, large file transfer protocol and/or hard drives to the Project Documentation Centre. In a case where USB/hard drive has been submitted, a notification email, with the transmittal note attached, is sent to the project generic email address. The *Employer's* Representative is copied on the email as well.
- Hard copies are submitted to the *Employer's* Representative accompanied by the Transmittal Note.

3.4.1.4 As-built drawings, operating manuals and maintenance schedules

The *Contractor* is responsible for the compilation and the supply of all the documentation required during the various project stages and to provide the documentation programmed to link with the milestone dates. Documentation and drawings are programmed for delivery to meet the milestone dates and in accordance with the agreed programme.

At Take-over the *Contractor* provides two full sets of as-built documentation as hard copies and electronic PDF and native CAD formats (.DGN or .DWG which must be compatible with Bentley Microstation) to the *Employer*.

All documentation, including reports, manuals, etc. is in the English language.

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3.4.1.4.1 Documentation System

The *Contractor's* document system is comprehensive in the management and control of the documentation based on a master document. Automatic prevention of duplication of numbering or ambiguity is built into the system.

All documentation submitted, by the *Contractor*, is accompanied by a signed documentation transmittal note.

The *Contractor* provides the following three weeks before the commissioning

- As-built revision of all the design documents;
- Operating and maintenance manuals were applicable.
- Inspections and test records for the tests and inspections required.

3.4.1.4.2 Documentation Control

The *Contractor* implements a comprehensive document control of all documents, their revision status and of the document status in relation to the 'as built' and 'as designed' or commonly known as "Approved for Construction" status. Procedures, document control, flow diagrams and indexes are included in this system. The drawing register contains the following information and is submitted monthly in a Microsoft Excel format to the *Employer*:

- Drawing number (*Employer* and *Contractor's* number)
- Revision
- Approval status
- Location of drawing at that stage
- Drawing description
- Sheet number
- Transmittal number
- Date of submission

3.4.1.4.3 Material Certificates

The *Contractor* provides a copy of the Materials Test certificates for all components included in the Data Books.

3.4.1.4.4 Final Data Book

The *Contractor* is responsible for the provision of a final data book.

The final data book is broken down in two main categories:

- Technical category
- Cost and planning category

The document contains all the relevant documentation, designs, drawings including as-built drawings, materials certificates, and product specifications on all products used, tests and results etc. which were applicable during the contract. The *Contractor* ensures that all relevant documentation is traceable and cross referenced where applicable.

All planning, scheduling, bar charts, milestones, detailed cost breakdown information, packing and transport are included in the final document.

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The content is laid out in a logical manner with main and sub-sections where all the relevant documentation is grouped.

The contents are presented in a hard cover file or files.

The data packages are prepared on a daily basis for all completed work.

Two hard copies and one soft copy of the Data Book are handed to the *Employer* for acceptance.

3.4.1.4.5 Civil Structural Drawings

The drawings include final general arrangements. Drawings include sections and details to fully identify design concepts, design loadings and any other special features.

Drawings are fully dimensioned and the dimension figures on the drawing are deemed to be correct, even if the drawings are not to scale. No dimensions are obtained from a drawing by scaling.

All drawings show full endorsement by a Professional Civil Engineer (including Pr. Eng Number and signature evident on all civil and structural drawings).

4. CONSTRUCTION

4.1 GENERAL

The *Contractor* is required to:

a) Adhere to the South African Environment Protection Act, the waste management code of practice and the South African Occupational Health and Safety Act No. 85 of 1993, the regulations promulgated thereunder and Eskom Safety, Health, Environment and Quality (SHEQ) Policy 32-727 for all *works*.

b) Submit a comprehensive method statement of the entire *works* to the *Project Manager* for acceptance prior to the start of the *works*

c) Submit a project specific safety file to the *Employer* for comments / acceptance.

d) Submit a detailed level 3 schedule for the *works* to the *Project Manager* for acceptance 2 weeks after contract award.

e) Prepare earthworks for craneage access and working rigging areas if required.

f) Dispose of all rubble at a waste disposal site to be approved by the *Employer*. The waste disposal site is selected to suit the classification of the materials to be disposed of. Certificates of disposal are submitted to the *Employer*.

g) Continuously monitor the condition in demolition areas and surrounding areas for any hazardous substances and in such case, the *Contractor* takes necessary precautionary measures.

h) Manage his access to the working areas and the Site.

i) Manage his activities on Site to ensure that no interference takes place between his work and that of others.

j) Complete "Contract Activities Daily Reports".

k) Liaise with the *Project Manager* regarding utilities and telephone facilities required for his Site establishment.

l) Liaise with the *Project Manager* regarding the location of waste disposal sites and rubbish dumps,

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m) Maintain and promotes labour harmony on the Site and in the working environment.

n) Immediately report any potential labour disharmony to the *Project Manager*.

o) Not recruit or employ any personnel from the *Employer* and Others, without prior acceptance of the *Project Manager*.

4.2 CONSTRUCTION AND ERECTION

a) The *Contractor* is responsible for the safety of all personnel involved in the *works* as well as the safety of all personnel and other members of the public affected by the construction of the *works*.

b) The *Contractor* is responsible for the design, erection, maintenance and removal of all temporary bracing or propping or falsework required for the execution of the *works*.

c) All construction works complies with SANS 1200 standardised specification for civil engineering construction and SANS 10400 for all building works.

4.3 QUALITY MANAGEMENT

a) The *Contractor* submits a fully detailed Quality Control Plan (QCP) and Inspection and Test Plan (ITP) for acceptance within four weeks of the Contract Date. The *Employer* indicates holds point in the ITP.

b) The *Contractor* submits a schedule of unplaced orders to be placed and this is updated regularly.

c) The *Contractor* is responsible for defining the level of QA/QC (intervention Points) or inspection to be imposed on his Sub-Contractors and suppliers of material in the Quality Control Plans (QCPs). This level is based on the criticality of equipment and be submitted to the *Project Manager* for acceptance.

d) The *Contractor* submits on a monthly basis, the following QA returns:

- A register of Defects with those older than 30 days being flagged and an explanation attached
- Register of accepted Defects
- A register of Non Conformance Report
- Monthly Project Quality Report
- Monthly updated Site and pre-site programmes
- Inspection dates
- Site Acceptance Tests
- Inspections completed / outstanding

e) All quality control documentation is submitted to the *Project Manager* within 7 days of Contract date.

4.4 HANDOVER

a) Apart from any statutory data packages required, the *Contractor* also compiles a data package of the relevant drawings, test certificates etc. which he submits to the *Project Manager* for acceptance. These include, but are not limited to:

- Welding procedure specifications
- Welder qualifications

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- Non-destructive weld test results
- Weld test certificates
- Steel grade certificates
- Concrete test results
- Material Certificates
- Compaction results
- As-built data and drawings of the completed *works* upon handover. As-built drawings are submitted in PDF and native CAD formats (.DGN)
- Structural Certificate signed by the Professional Civil Engineer confirming that *works* have been constructed in accordance with the design.

5. SPECIFICATIONS FOR THE *WORKS*

5.1 APPLICABLE NATIONAL STANDARDS

The *Contractor* is required to adhere to the latest editions of, and the normative references within, the following SANS standards, codes of practice, regulations & standards:

Number	Title
240-54937450	Fire Protection & Life Safety Design Standard
240-56364535	Architectural Design and Green Building Compliance Manual
240-56364545	Structural Design and Engineering Standard
240-56737448	Fire Detection & Life Safety Design Standard
240-76992014	Project / Plant Specific Technical Documents and Records Management Work Instruction
240-86973501	Engineering drawing Standard
AWS D1.1	American Welding Society - Structural Welding Code - Steel
SANS 0142-1	The wiring of premises Part 1: Low-voltage installations
SANS 10044-1	Welding Part 1: Glossary of terms
SANS 10064	The preparation of steel surfaces for coating
SANS 10100-1	The Structural Use Of Concrete Part 1 – Design
SANS 10100-2	The Structural Use Of Concrete Part 2 – Materials and execution of work
SANS 10160	Basis of structural design and actions for buildings and industrial structures
SANS 10162-1	The structural use of steel Part 1: Limit-states design of hot- rolled steelwork
SANS 10162-2	The structural use of steel Part 2: Cold-formed steel structures
SANS 10400 Series	The Application of the National Building Regulations
SANS 1200 Series	Standardised specification for civil engineering construction
SANS 121	Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods
SANS 2001 Series	Construction *Works*
SANS 2553	Welded, brazed and soldered joints - Symbolic representation on drawings

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Number	Title
SANS 50025 series	Hot rolled products of structural steels Parts 1-6
SANS 9606-1	Approval testing of welders - Fusion welding Part 1: Steels
SANS 164-0	Plug and socket-outlet systems for household and similar purposes for use in South Africa – Part 0: General and safety requirements
SANS 556-1	Low-voltage switchgear – Part 1: Circuit-breakers
SANS 1063	Earth rods, couplers and connections
240-56356396	Earthing and Lightning Protection Standard
240-77302094	Cable Termination Schedules
240-40643427	Coding and Labelling Standard
SANS 61084-1	Cable trunking and ducting systems for electrical installations – Part 1: General requirements
SANS 1973	Distribution boards Type testing and Safety of distribution boards.
SANS 60598-1	Luminaires for interior lighting, street lighting and floodlighting

5.2 ADDITIONAL REQUIREMENTS AND PREREQUISITES

5.2.1 General

a) The *Contractor* is required to confirm all site dimensions, levels and cast-in items positions on site prior to casting of concrete or any fabrication of steel and other materials that are required for the *works*.

b) The *Contractor* is required to submit a comprehensive method statement of the *works* to the *Project Manager* for acceptance prior to the start of the *works*

c) The *Contractor* takes full professional accountability and liability for all temporary items required for the execution of the *works*.

d) The *Contractor* notifies the *Employer* of the hold points.

6. INFORMATION ISSUED BY THE *EMPLOYER*

The following documents are issued to the *Contractor* for information.

Document Number / ID	Document Title	Revision	Status
240-56364545	Structural Design and Engineering Standard	3	For Information
240-56364535	Architectural Design and Green Building Compliance Manual	3	For Information
Drawing	Refuse Warehouse layout of existing building and new addition – Final concept		For information

7. AUTHORISATION

This document has been seen and accepted by:

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Name & Surname	Designation
~~Amogelang Mokgoko~~	Senior Advisor Architecture
~~André Bignaut~~	Senior Advisor Electrical - Lighting
~~Andrew Koenane~~	Engineer - Electrical
~~Byron Thomas~~	Engineer - Structural
~~Kameel Burath~~	Engineer - Structural
~~Palesa Moleko~~	Project Manger

8. REVISIONS

Date	Rev.	Compiler	Remarks
October 2020	0.1	BW Thomas	First Draft
March 2021	0.2	BW Thomas	Incorporation of comments from other disciplines
April 2021	0.3	BW Thomas	Comments from the MDR
April 2021	1.0	BW Thomas	Final Draft
November 2021	1.1	BW Thomas	Updated for re-issue
November 2021	2.0	BW Thomas	Final

9. DEVELOPMENT TEAM

- ~~Byron Thomas~~
- ~~Kameel Burath~~

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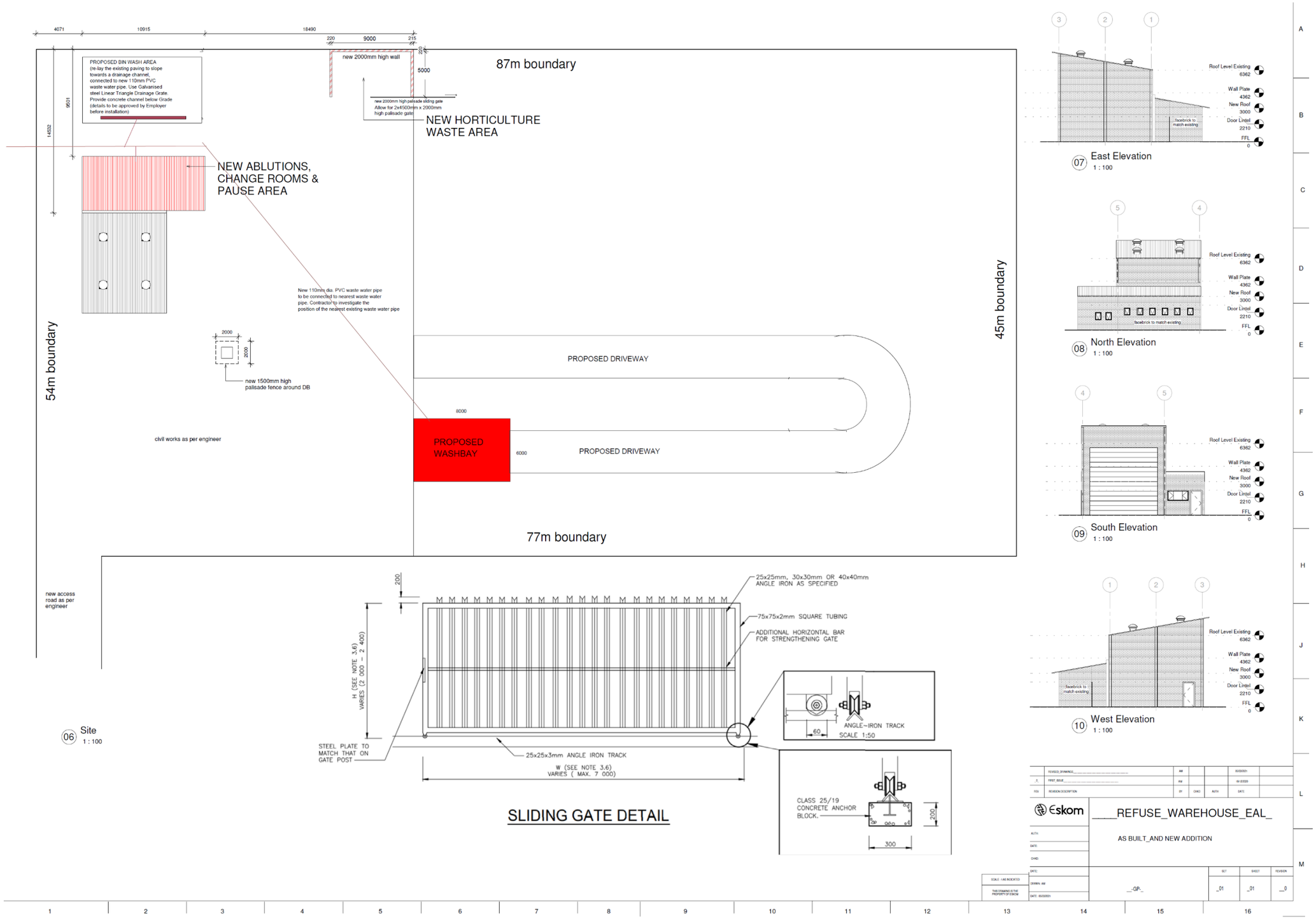
10. CONCEPT LAYOUT



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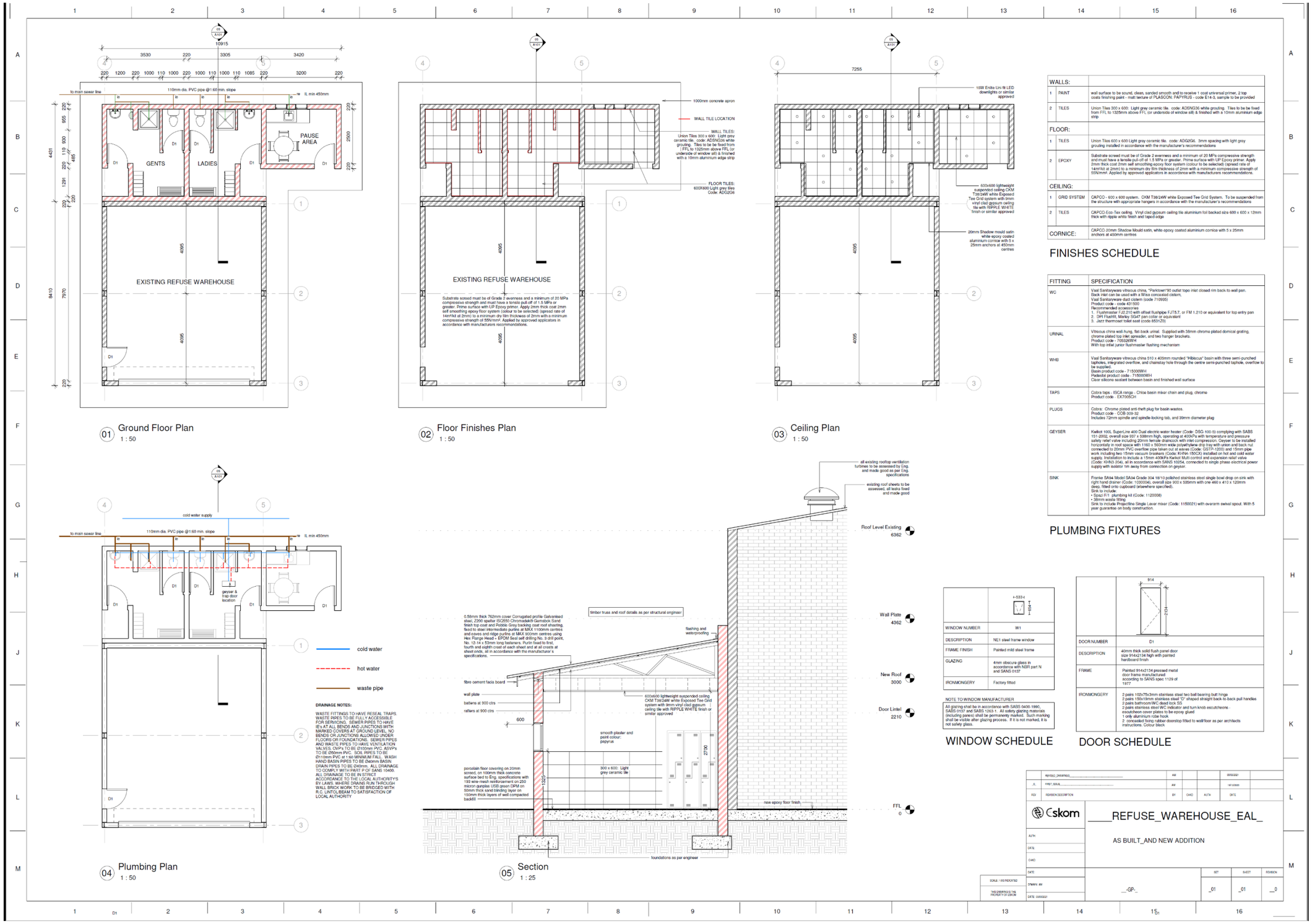

WALLS:		
1	PAINT	wall surface to be sound, clean, sanded smooth and to receive 1 coat universal primer, 2 top coats finishing paint - matt texture of PLASCON. PATYRU9 - code E14-3, sample to be provided
2	TILES	Union Tiles 300 x 600 Light grey ceramic tile. code: ADSNG36 white grouting. Tiles to be be fixed from FFL to 1325mm above FFL (or underside of window sill) & finished with a 10mm aluminium edge strip
FLOOR:		
1	TILES	Union Tiles 600 x 600 Light grey ceramic tile. code: ADG2G6. 3mm spacing with light grey grouting installed in accordance with the manufacturer's recommendations
2	EPOXY	Substrate screed must be of Grade 2 evenness and a minimum of 20 MPa compressive strength and must have a tensile pull-off of 1.5 MPa or greater. Prime surface with UP Epoxy primer. Apply 2mm thick coat 2mm self smoothing epoxy floor system (colour to be selected) (spread rate of 14m²/kit at 2mm) to a minimum dry film thickness of 2mm with a minimum compressive strength of 55N/mm². Applied by approved applicators in accordance with manufacturers recommendations.
CEILING:		
1	GRID SYSTEM	CAPCO - 600 x 600 system. CKM T38/24W white Exposed Tee Grid System. To be suspended from the structure with appropriate hangers in accordance with the manufacturer's recommendations
2	TILES	CAPCO Eco-Tex ceiling. Vinyl clad gypsum ceiling tile aluminium foil backed size 600 x 600 x 12mm thick with ripple white finish and taped edge
CORNICE:		CAPCO 20mm Shadow Mould satin, white epoxy coated aluminium cornice with 5 x 25mm anchors at 450mm centres

FINISHES SCHEDULE

FITTING	SPECIFICATION
WC	Vaal Sanitaryware vitreous china, "Parktown"90 outlet top inlet closed rim back to wall pan. Back inlet can be used with a Wirra concealed cistern, Vaal Sanitaryware dual cistern (code 719995) Product code - code 431500 Recommended accessories 1. Flushmaster FJ2.210 with offset flushpipe FJT5.7, or FM 1.210 or equivalent for top entry pan 2. DPI Flushfit, Marley SG47 pan collar or equivalent 3. Jazz thermoset toilet seat (code 853120)
URINAL	Vitreous china wall-hung, flat back urinal. Supplied with 58mm chrome plated domical grating, chrome plated top inlet spreader, and two hanger brackets. Product code - 705326WH With top inlet junior flushmaster flushing mechanism
WHB	Vaal Sanitaryware vitreous china 510 x 405mm rounded "Hibiscus" basin with three semi-punched tapholes, integrated overflow, and chainstay hole through the centre semi-punched taphole, overflow to be supplied. Basin product code - 715000WH Pedestal product code - 715000WH Clear silicone sealant between basin and finished wall surface
TAPS	Cobra taps - ESCA range - Chloe basin mixer chain and plug, chrome Product code - EX7005CH
PLUGS	Cobra: Chrome plated anti-theft plug for basin wastes. Product code - COB-309-32 Includes 72mm spindle and spindle-locking tab, and 39mm diameter plug
GEYSER	Kwikot 100L SuperLine 400 Dual electric water heater (Code: DSG-100-S) complying with SABS 151-2002, overall size 937 x 538mm high, operating at 400kPa with temperature and pressure safety relief valve including 20mm female drainncock with inlet compression. Geyser to be installed horizontally in roof space with 1160 x 560mm wide polyethylene drip tray with union and back nut connected to 20mm PVC overflow pipe taken out at eaves (Code: GSTP-1200) and 15mm pipe work including two 15mm vacuum breakers (Code: KHN4-150CX) installed on hot and cold water supply. Installation to include a 15mm 400kPa Kwikot Multi control and expansion relief valve (Code: KHN3-304), all in accordance with SANS 10254, connected to single phase electrical power supply with isolator 1m away from connection on geyser.
SINK	Franke SAX94 Model SAX94 Grade 304 18/10 polished stainless steel single bowl drop on sink with right hand drainer (Code: 1030004), overall size 900 x 535mm with one 460 x 410 x 120mm deep, fitted onto cupboard (elsewhere specified). Sink to include: • Spaz F11 plumbing kit (Code: 1120008) • 38mm waste fitting Sink to include Projectline Single Lever mixer (Code: 1150021) with ovarm swivel spout. With 5 year guarantee on body construction.

PLUMBING FIXTURES

04 Plumbing Plan
1 : 50

05 Section
1 : 25

	+-533-+
WINDOW NUMBER	W1
DESCRIPTION	NE1 steel frame window
FRAME FINISH	Painted mild steel frame
GLAZING	4mm obscure glass in accordance with NBR part N and SANS 0137
IRONMONGERY	Factory fitted

NOTE TO WINDOW MANUFACTURER
All glazing shall be in accordance with SABS 0400:1990, SABS 0137 and SABS 1263-1. All safety glazing materials (including panes) shall be permanently marked. Such marking shall be visible after glazing process. If it is not marked, it is not safety glass.

WINDOW SCHEDULE

	914 / 2134
DOOR NUMBER	D1
DESCRIPTION	40mm thick solid flush panel door size 914x2134 high with painted hardboard finish
FRAME	Painted 914x2134 pressed metal door frame manufactured according to SANS spec 1129 of 1977.
IRONMONGERY	2 pairs 102x75x3mm stainless steel two ball bearing butt hinge 2 pairs 150x19mm stainless steel "D" shaped straight back-to-back pull handles 2 pairs bathroom/WC dead lock SS 2 pairs stainless steel WC indicator and turn knob escutcheons - escutcheon cover plates to be epoxy glued 1 only aluminium robe hook 2 concealed fixing rubber doorstop fitted to wall/floor as per architects instructions. Colour black

DOOR SCHEDULE

	REVISED DRAWINGS	AM			09/05/2021
	FIRST ISSUE	AM			19/12/2020
REV.	REVISION DESCRIPTION	BY	CHKD	AUTH	DATE

Eskom

AUTH:
DATE:
CHKD:
DATE:
SCALE: 1:50 INDICATED
THIS DRAWING IS THE PROPERTY OF ESKOM
DRAWN: AM
DATE: 09/05/2021

____REFUSE_WAREHOUSE_EAL_

AS BUILT_AND NEW ADDITION

SET	SHEET	REVISION
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