Eskom	Technical Specification	Engineering

Title: **Medupi Power station Weighbridge and access control building and infrastructure technical specification**

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1 INTRODUCTION

Medupi Power Station is situated approximately 15km North-West from the Town of Lephalale in Waterberg District, Limpopo Province. Medupi Power Station is designed to generate 4800MW baseload and was commissioned between 2015 and 2021. The expected life of the plant is 50 years from the dates of Commercial Operation.

The Power Station is currently operating without a permanent weighbridge on-site, currently using an external weighbridge for weighing of delivery trucks carrying loads to be hauled to site for various purposes. The current weighing method has incurred costs to the business and gives a risk of inaccurate delivery loads onto site with resultant excessive cost and time impacts. Consequently, a permanent weight bridge facility is required to weigh delivery trucks in line with the Medupi URS requirements.

The bi-directional Weighbridge system and Access Control Building is to be designed and constructed at Medupi Power Station Gate 4 entrance. Additionally, the weighing of delivery trucks system shall include the weighbridge control room, access control building and other works inclusive of but not limited to the HVAC systems, Low pressure services, drainage systems, access roads and all works described in this scope to have an operating and maintainable security delivery system at Gate 4. The area is required to comply to the relevant National Key Point (NKP) security requirements during delivery activities.

The Weighbridge project is intended to allow for the weighing of delivery trucks carrying the following loads onto site:
1. Fuel Oil.
2. Coal (reject or supply).
3. Limestone (for future FGD plant).
4. Gypsum (for future FGD plant); and
5. Any other loads which required to be verified over the life of the power station.

2 SUPPORTING CLAUSES

2.1 SCOPE

This scope of works provides information to the *Contractor* for the complete works required for the design, supply, construct, installation, and commissioning of the Weighbridge inclusive of the weighbridge control room system & equipment.

The project also includes design and construction of Access Control Building with ablution facilities and the Weighbridge control room at Gate 4 at Medupi Power Station. The project will include associated infrastructure such as the access road & modification of existing roads, fencing, building services including but not limited to building services, CBMS; HVAC, C&I works such as surveillance, weighing ticketing system, inventory and monitoring systems; plumbing and incidental works, Electrical components, and Low-pressure services for a holistic system.

The Contractor shall verify and optimise the Employer's conceptual Design and takes full accountability for the Design.The Employer intends issuing previously completed concept design to the Contractor to review and adopt or modify to the extent necessary to assume professional design accountability and liability for the issued design. The Contractor shall consider the existing concept designs as basis for further development.

2.1.1 Purpose

The purpose of this document is to provide the scope of work to appoint a suitable contractor for the design, construction, supply, installation, commissioning, and handover of the Medupi Power Station the Weighbridge at Gate 4 access inclusive of the weighbridge control room system & equipment, Access Control Building and the Weighbridge control room and associated infrastructure.

2.1.2 Applicability

This document shall apply to Medupi Power Station only.

2.1.3 Disclosure Classification

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

2.2 NORMATIVE/INFORMATIVE REFERENCES

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

2.2.1 Normative

[1] Occupational Health and Safety Act (Act 85 of 1993) with associated regulations
[2] ISO 9001: Quality Management System Requirements
[3] Occupational Health and Safety Management Systems Requirements (OHSAS 18001)
[4] Standard Building Regulations, Preambles and SABS 1200 requirements.
[5] UK charted Institution of Building services Engineers Guidebook, CIBSE
[6] BS 5720 British Standard: Code of practice for mechanical ventilation and air conditioning in buildings
[7] BS 8233 British Standard: Code of practice for sound insulation and noise reduction in buildings
[8] ASHRAE 15-2010 Safety Codes for mechanical refrigeration
[9] ASHRAE 34-2010 Designation and safety classification of refrigerants
[10] ASHRAE 62 Ventilation for acceptable indoor air quality
[11] ASHRAE 55 Thermal environmental condition for human occupancy
[12] ASHRAE 52/76 Standard test method
[13] ASHRAE G1 Guideline for commissioning air conditioning systems
[14] VGB-R 171e First Edition Guidelines for the supply of technical documentation for fossil-fired and regenerative power stations
[15] 200-11303 - Medupi Occupational Health, Safety and Management Policy [16] The National Water Act (Act No. 36 of 1998).
[17] The Environmental Conservation Act (Act No 73 of 1989).
[18] Government Notice 704, National Water Act 1998.
[19] PAM/244/001 Management of Maintenance Waste to Minimise Environmental Impact
[20] 32-245 - Eskom Waste Management Standard
[21] 32-421 - Eskom Life Saving Rules
[22] 36-681 - Eskom Plant Safety Regulations
[23] 240-60490979 - OHS Operational Plan
[24] 200-1679 - Project Quality Plan
[25] 200-1689 - Medupi Quality Specifications

[26] 200-45965 - Manufacturing Inspection and Testing
[27] 200-46362 - Site Inspections Procedure
[28] 200-129834 Storage and Preservation
[29] 200-1680 - Document and Record Management Procedure
[30] 200-53810 - Documentation Handover List
[31] 240-86973501 - Engineering Drawing Standards
[32] 240-61227631 - Piping and Instrumentation Diagram (P&ID) Standard
[33] 200-42385 MDL Management Procedure [34] 200-5667 Control of Drawings Procedure
[35] 200-64539 Documentation Format and Layout Specification
[36] ISO 10007 Guidelines for Configuration Management
[37] KKS Key Part – Fossil power station (NPSZ 45-45) – 200-18202
[38] The application of KKS plant coding (NMP 45-7) – 200-4190
[39] 36-776 Rev 0 Environmental Conditions for Process Control Electronic Equipment Used at Power Stations (GGS 1426 Rev 0)
[40] 240-102547991 General Technical Specifications for HVAC Systems Standard.
[41] Medupi Weigh Bridge Control Room and Gate House HVAC Installation Specification and BOQ Rev200-3340, Medupi Label Specification
[42] 200-5343, Medupi Power Station Project Standard Abbreviation
[43] 36-817 Eskom Ups Standard
[44] 240-54179170, Technology Documentation Classification and Designation Standard
[45] 200-5664, Medupi Change Management Procedure
[46] 200-71827, (EED_GTD_C&I_006), Alarm Management System Guideline
[47] 240-56737448, Fire Detection and Life Safety Design Standard
[48] 240-54937450, Fire Protection & Life Safety Design Standard
[49] 200200-26680, Medupi Power Station Architectural Technical Specifications for Structures and Other Buildings
[50] 200-24289 (Ssz_45-17), Medupi Power Station Corrosion Protection Specification
[51] 200-3583, The Identification of The Contents of Pipelines and Vessels
[52] 200-64539, Documentation Format and Layout Specification
[53] 200-94660 - Issuing of KKS certificate.
[54] 200-3340 - Medupi Label specification
[55] 200-5343 - Employer's abbreviation standard
[56] 200-5664 - Medupi ECM Procedure
[57] 200-11757, Earthing and Lightning Protection Standard
[58] 200-11768, Medupi Power Station Cable and Racking Standard
[59] 200-71827 EED_GTD_C&I_006 Rev 0 Alarm Management System Guideline
[60] GGS 0456 Rev 4. Specification for LV Switchgear and Control Gear Assemblies and Associated
Equipment For Voltages Up to And Including 1000 V Ac And 1500 V DC
[61] ESKSCAAC6 Rev 0. Specification for the Identification of the Contents of Pipelines and Vessels.
[62] 240-56227443, Requirements for Control and Power Cables for Power Stations
[63] 240-56355754, Field Instrument Installation Standard
[64] 240-56355815, Junction Boxes and Cable Termination Standard
[65] 240-56355789, Flow Measurement Systems Installation Standard
[66] 240-56355843, Pressure Measurement Systems Installation Standard
[67] 240-56355888, Temperature Measurement Systems Installation Standard
[68] GGS1427, Impulse Piping
[69] PPZ 200 -16714, Commissioning and Completion of Medupi Power Station
[70] 240-531136850 - Eskom Design Review procedure

[71] 200-16817 - Excavation Permit Application Procedure
[72] 200 16714 - Medupi Commissioning procedure
[73] 200-15406 - Issue Takeover Certificate
[74] SANS 10108 – The Classification of Hazardous Locations and Selection of Equipment for Use in Such Locations
[75] 240-56536505 - Hazardous Location Standard
[76] 240-106628253 - Standard for Welding Requirement on Eskom plant
[77] 240-54937450 - Fire Protection & Life Safety Design Standard
[78] 240-56356376 - Site commissioning for low pressure services
[79] 200-11757 - Medupi Power Station Earthing and Lightning Protection Standard
[80] 240-55714363 - Coal-Fired Power Stations Lighting and Small Power Installation Standard
[81] 200-11768 - Medupi power Station cabling and racking standard.
[82] 200-38425 - Procedure for Hazard Identification and Risk Assessment
[83] 240 54937439 - Fire Protection/Detection Assessment Standard
[84] 240-49230030 - Reliability Engineering Analysis Guideline
[85] 240-49230046 - Failure Mode and Effect Analysis (FMEA) Guideline
[86] 240-49230067 - Life Data Analysis Guideline
[87] 240-49230100 - Safety Engineering Analysis Guideline
[88] 240-49230111 - Hazard and Operability Analysis (HAZOP) Guideline
[89] 240-49910508 - Environmental Analysis Guideline
[90] 240-50056004 - Constructability Analysis Guideline
[91] 240-56364545 - Structural Design and Engineering Standard
[92] 240-84418186 - Road Specification Manual
[93] 240-57127955 - Standard for Design of Drainage and Sewerage Infrastructure
[94] 240-57127955 - Geotechnical and Foundation Engineering Standard
[95] SANS 10144 - Detailing of reinforcement for concrete.
[96] SANS 10102 – 1 The selection of pipes for buried pipelines Part 1: General provisions.
[97] SANS 10102 – 2 The selection of pipes for buried pipelines Part 2: Rigid pipes.
[98] SANS 1024 - Welded steel fabric for reinforcement of concrete
[99] SANS 10400 - All Parts National Building regulations
[100] SANS 10400 - The application of the National Building Regulations
[101] SANS 1115 - Cast iron gratings for gullies and storm water drains.
[102] SANS 1123 - Pipe flanges
[103] SANS 1200 A - Standardized specification for civil engineering construction Section A: General
[104] SANS 1200 DA - Standardized specification for civil engineering construction Section DA: Earthworks (small works)
[105] SANS 1200 DE - Standardized specification for civil engineering construction Section DE: Small earth dams
[106] SANS 1200 DB - Standardized specification for civil engineering construction Section DB: Earthworks (pipe trenches)
[107] SANS 1200 DK - Standardized specification for civil engineering construction Section DK: Gabions and pitching.
[108] SANS 1200 LB - Standardized specification for civil engineering construction Section LB: Bedding (pipes)
[109] SANS 1601 - Structured wall pipes and fittings of unplasticized poly (vinyl chloride) (PVC-U) for buried drainage and sewerage systems.
[110] SANS 1200 LE - Standardized specification for civil engineering construction Section LE: Storm water drainage
[111] SANS 2001-CC1 - Construction works Part CC1: Concrete works (structural)

[112] SANS 2001-CM1 - Construction works Part CM1: Masonry walling.
[113] SANS 2001-CM2 - Construction works Part CM2: Strip footings, pad footings and slab-on-the ground foundations for masonry walling.
[114] SANS 285 - Calcium silicate masonry units
[115] SANS 2001-DP1 - Construction works Part DP1: Earthworks for buried pipelines and prefabricated culverts.
[116] SANS 2001-DP4 - Construction works Part DP5: Sewers
[117] SANS 2001-DP5 - Construction works Part DP5: Storm water drainage.
[118] SANS 2001-CS1 Construction works.
[119] SANS 207 - The design & construction of reinforced soils & fills
[120] SANS 282 - Bending dimensions and scheduling of steel reinforcement for concrete.
[121] SANS 5863 - Concrete tests - Compressive strength of hardened concrete
[122] SANS 227 - Burnt clay masonry units.
[123] SANS 10021 - The waterproofing of buildings (including damp-proofing and vapour barrier installation)
[124] SANS 62 - Steel pipes Part 1 &2
[125] SANS 8870 - Drainage Pipework
[126] SANS 8872 - Drainage Pipework
[127] SANS 920 - Steel bars for concrete reinforcement
[128] SANS 10162-1-The structural use of steel Part 1: Limit-states design of hot-rolled steelwork
[129] SANS 10162-2 - The structural use of steel Part 2: Cold-formed steel structures
[130] SANS 1700-16-2 - Fasteners Part 16: Washers Section 2
[131] SANS 1700-16-3 - Fasteners Part 16: Washers Section 3: Plain washers chamfered.
[132] SANS 121 - Hot dip galvanized coatings on fabricated iron and steel articles
[133] SANS 10102-1 The selection of pipes for buried pipelines Part 1: General provisions.
[134] SANS 10102-2 Selection of pipes for buried pipelines Part 2: Rigid pipes.
[135] SANS 986 Precast reinforced concrete culverts
[136] SANS 927 Precast concrete kerbs, edgings, and channels
[137] SANS 824 Lime for soil stabilization
[138] SANS 50197-1 Cement Part 1: Composition, specifications, and conformity criteria for common cements
[139] SANS 1058 Concrete paving blocks
[140] SANS 1350 Guardrails for roads (W-section)
[141] SANS 457 Wooden poles, droppers, guardrail posts and spacer blocks
[142] SANS 10005 The preservative treatment of timber
[143] SANS 538 High temperature wood-preserving creosote
[144] SANS 539 Wood-preserving creosote
[145] SANS 1519 Road signs
[146] SANS 731-1 Road markings
[147] SANS 2001-BE1 Construction works Part BE1: Earthworks (general)
[148] SANS 1200 M Standardized specification for civil engineering construction Section M
[149] SANS 60079-part 15 Electrical apparatus for explosive gas atmosphere
[150] SANS 1507 Electrical Cables
[151] SANS 60439 Low-voltage switchgear and control gear assemblies
[152] SANS 0142-1 Standard Regulations for Wiring of Premises
[153] SANS 101003 - 2004 Noise level.
[154] SABS 1424 Filters used in air conditioning and general ventilation.
[155] SABS 1238 1979 "Standard Specification for Air Conditioning Ductwork
[156] SABS 0173 1980 "Code of Practice for the Installation, Testing and Balancing of Air Conditioning Ductwork".

[157] SANS 60079-part 15 Electrical apparatus for explosive gas atmosphere
[158] SANS 0108-1974 Classification of hazardous locations
[159] SANS 10160-4 - Basis of structural design and actions for buildings and industrial structures Part 4: Seismic actions and general requirements for buildings
[160] EN 1998-1: Eurocode 8: Design of structures for earthquake resistance – Part 1: General rules, seismic actions, and rules for buildings
[161] 200-3583 Specification for the Identification of the Contents of Pipelines and Vessels
[162] 200-6166 Eskom backfill specification.
[163] SSZ_45-17 - Medupi Power Station Corrosion Protection Specification
[164] 84CIVL053 - Medupi Power Station Specification for Structural Concrete [164] 200-466984 - CIVL031 General Fence Specification
[165] IEC 61511: Functional Safety – Safety Instrumented Systems for the Process Industry Sector
[166] IEC 61508: Functional Safety of Electrical/Electronic/Programmable Electronic Safety Related Systems
[167] IEC IEC 62381 Automation systems in the process industry - Factory acceptance test (FAT), site acceptance test (SAT), and site integration test (SIT)
[168] 240-56356396 Earthing Standard
[169] 240-56227443 Requirements for Control and Power Cables for Power Stations
[170] 200-11768 Station Cabling and Racking standard.
[171] SANS 60794-1-1 Optical fibre cables - Part 1-1: Generic specification – Genera
[172] SANS 61312 Protection against lightning electromagnetic impulse
[173] ANSI/TIA-942-A: Telecommunication infrastructure standard for data centres
[174] ANSI/TIA 568: Telecommunication cabling generic standard and component (fibre optic and twisted pair cabling) specific standards.
[175] ANSI/TIA 569: Communication pathways and spaces (racking, trunking) standard
[176] ANSI/TIA 607: Grounding and bonding of communication cabling standard
[177] SANS, relevant and applicable
[178] Regulatory and legislative requirements (relevant and applicable)
[179] National Building Regulations
[180] SANS 10400

2.3 DEFINITIONS

Definition	Description
Availability	Indicates the percentage probability that a component or system is in the required operational state at a given time.
Calibration	A set of operations that establish the relationship between values of quantities indicated by a measuring instrument, and the corresponding values realized by standards.
Detail Design	Process to develop and issue Approved for Construction documents and drawings in accordance with the Design Base, including Quality Control, Quality Assurance, and Change Management.
Electronic load-cell scale	A mass meter of which the load transmitting device comprises or includes one or more load cells which measure the mass of a load and transmit the value thereof in the form of an electrical signal to a manually operated or self-indicating electronic measuring device which provides analogue or digital indication of the mass of the load.
Gross weight	Total weight without deductions.
Maintainability	The relative ease and economy of time with which a failed component or system can be restored to a specific condition when maintenance is performed.
Platform scale	A mass meter consisting of a load receptor in the form of a platform, a load transmitting device, and a load measuring and indicating device.
Pipework	Pipes and fittings used for the conveyance of fuel, water, gases, or other fluids.
Reliability	The percentage probability that a component, system or process will function without failure as required, under stated conditions, for a stated period of time.
Stakeholder	Anyone that has an interest or is affected by the outcome of the project.
Supplier	A party whose business is to supply a particular service or commodity.
System	An integrated set of constituent pieces that are combined in an operational or support environment to accomplish a defined objective. These pieces include people, hardware, software, firmware, information, procedures, facilities, services, and other support facets.
Tarpaulin	A waterproof fabric sheet used to cover the tip bin mounted on a truck's trailer.
Tare weight	The weight of an empty vehicle or container.
Truck(s)	Tandem Axle Side Tip Interlink Combination Truck.
Valve	A device for shutting-off or controlling the flow of a fluid through a pipe or duct.
Vehicle scale	A mass meter for the determination of the mass of road vehicles, with a load receptor in the form of a platform on which road vehicles may be moved for the measurement of their mass.
Verification	Means to certify the accuracy of any measuring instrument on the basis of any relevant measuring standard.
Weighbridge	A roadway mounted platform scale for weighing vehicles.

2.3.1 ABBREVIATIONS

Abbreviation & Acronym	Description
AIA	Approved Inspection Authority
CBMS	Consolidate Building Management System
C&I	Control & Instrumentation
CM	Configuration Management
CRA	Concept Release Approval
DRA	Definition Release Approval
DWS	Department of Water and Sanitation
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ERA	Execution Release Approval
EDWL	Engineering Design Work Lead
FAT	Factory Acceptance Test
FTE	Full Time Employee
GTE	Group Technology Engineering
HAZOP	Hazard and Operability Study
ITP	Inspection And Test Plan
WULA	Integrated Water Use Licence Application
KKS	Kraftwerk Kennzeichen System
LDE	Lead Discipline Engineer
LPS	Low Pressure Services
MDL	Master Document List
OEM	Original Equipment Manufacturer
OHS	Occupational Health and Safety
PCM	Project Control Manual
PDD	Project Development Department
PDM	Project Design Manual
PEM	Project Engineering Manager
PM	Plant Maintenance
PPPFA	Preferential Procurement Policy Framework Act
RACI	Responsibility, Accountability, Consult and Inform
ROC	Requirements of capability
ROD	Record of Decision
SAT	Site acceptance test
SIT	Site integration test

SHE	Safety, Health & Environmental
SHEQ	Safety, Health, Environment, Quality
SPO	Smart Plant Enterprise for Owner Operators
SRD	Stakeholders Requirements Definition
URS	User Requirements Specifications
QCP	Quality Control Plan
WML	Waste Management Licence

2.4 ROLES AND RESPONSIBILITIES

The following roles and responsibilities apply:

Person	**Responsibility**
Approved Inspection Authority (AIA)	The AIA is an external agent representing the Department of Labour (Pressure Equipment and Regulations), responsible for reviewing designs of all critical plant areas and ensuring compliance to government construction code.
Contractor	The *Contractor s*hall design, execute, and complete the Works in accordance with the Contract and with the Designers' instructions, and shall remedy any defects in the Works.
Engineering Design Work Lead (EDWL)	He/she co-ordinates the design work provided by the discipline Design Engineering roles and integrates this work into a final integrated design product. He/she is the custodian of the requirements set and the interface register between packages and part of his/her role is to maintain this information. He remains responsible for the integrity of the engineering product and is accountable for the overall management of interfaces and delivery of an integrated product.
Lead Discipline Engineer (LDE)	The role of the Lead Discipline Engineering role is to manage the technical integrity of the design and be accountable for the management of the interfaces within their specific engineering domain
Site Construction Engineering Practitioner	The Site Construction Engineering role is part of the project engineering team and participates in conjunction with other team members of all disciplines to assure the technical integrity of a fully functional and operational plant that meets the user requirement and Eskom Engineering expectations and requirements. The role provides an assurance function. Quality inspections, Final acceptance, sign-off and approval
Quality Management	Quality ensures Contractor s build plant according to contractual specifications, and user requirements and codes. Quality is the custodian of the Quality Management System and quality records, and facilitates the work of the Approved Inspection Authority (AIA). The Quality Function's responsibility is to ensure Contractor s have a sound quality system in place. Quality checks these systems on behalf of the Employer.

2.5 PROCESS FOR MONITORING

As per the 240-531136850, Eskom Design Review procedure.

2.6 RELATED /SUPPORTING DOCUMENTS

Not Applicable

3 REQUIREMENTS

3.1 GENERAL REQUIREMENTS

1. The *Contractor shall* design, procure, supply, install and commission all items discussed later in this document according to the applicable codes and standards and the requirements in this document.

2. Where this document is not clear about the location of an item to be installed or work to be performed, it is the *Contractor's* responsibility to liaise with the *Employer through the Project Manager* to clarify the issue via Request for Information process.
3. The *Contractor* shall only act upon confirmation by receipt of an Instruction from the *Project Manager*. Incorrectly positioned items, or incorrect work done (where Instructions were not issued) shall be moved / removed / replaced / changed / reinstalled by the *Contractor* at his cost.
4. Any errors/faults that occur during the process will be corrected at the *Contractor* s cost.

5. The *Contractor* shall label the plant according to Medupi Power Station Label specification. (38-80410 KKS Plant Codification Standard)
6. Each drawing, diagram and list shall refer to the area of plant by means of the plant labelling in accordance with 240-86973501 Engineering Drawing Standards common requirements.
7. The *Contractor* shall supply a detailed design process and construction progress tracker to be review on weekly bases.
8. The Contractor shall comply with Eskom procedures, standards.

3.2 WEIGHBRIDGE FUNCTIONAL REQUIREMENTS

This section of the document details the requirements in terms of technical design and functional requirements for the weighbridge scale and the associated truck processing infrastructure.

3.2.1 Weighbridge Scale Platform Configuration

1 The platform scale shall be of the pitiless, above grade, raised weighbridge / platform configuration. Raised weighbridge scale shall employ a steel deck platform above grade, where the scale is located above several piers, or a slab on grade foundation with ramps leading up to and down from the scale.
2 The ramp and platform interface shall include anti-creep devises. Raised weighbridge scale shall provide access to the scale mechanism, load cells, junction boxes, cables and connectors via access plates mounted along the lengthwise edges of the scale platform.
3 The raised platform configuration will include heavy duty vehicle guide rails along the sides of the approach and departure ramps. These structures shall ensure that approaching and departing trucks are well aligned with the scale platform, thus preventing damage to the scale infrastructure and the vehicle itself. The raised platform configuration shall also include heavy duty vehicle guide rails of steel beam construction on both long edges of the scale platform, to ensure that the vehicle is located safely on the scale platform.
4 Positioned prior to the approach ramp of the weigh-out weighbridge, but after the *vertically oriented safety trip system* described in section *4.1.6* below, an impact protection structure shall be positioned in such a manner that if an approaching side tipper truck has its load box(s) in the unloading position the protective structure will then absorb the impact and deflect the load box immediately alerting the truck driver.
5 Working parts of all equipment shall be readily accessible for inspection, lubrication, and repair. Moving parts of any equipment shall also be guarded as required to protect personnel during operation.
6 The perimeter gap between the platform and the adjacent foundation walls or access ramp edges shall be provided with a wear resistant sealing system.
7 The weighbridge system shall be designed for trucks to enter and exit using a single bi-directional weighbridge, under the direction of the automatically controlled green / red traffic signal indication.

3.2.2 Weighbridge Scale Capacity

The weighbridge scale shall be designed to cater for a group axle load distribution. The scale shall have a minimum rated capacity of 60 metric tons (60,000 kg), and the scale platform's footprint shall measure 24m x 3m (minimum). The scale shall cater for normally loaded vehicles and is not required to cater for vehicles carrying abnormal loads.

3.2.3 Weighbridge Scale Platform Strength Requirements

A platform scale shall be of such strength and designed and constructed so that: A load equal to one half of the capacity of the scale, placed as near as possible to any edge of the load receptor, shall not cause the load receptor or any elements of the load transmitting device to yield unduly or cause the load receptor to disengage from any element of the load transmitting device: and where any load — the mass of which the scale is required to measure — weighing more than half the capacity of the scale, can be concentrated on an area less than half that of the load receptor (under normal conditions of use), the platform scale shall support such mass, so concentrated, without undue yielding of the load receptor, or of any element of the load transmitting device

3.3 SHE REQUIREMENTS

- The *Contractor* shall comply with the latest revision of the Eskom Plant Safety Regulations, site specific procedures and stipulations of the OHS Act.
- The *Contractor* Employees shall comply Eskom Medupi Power Station Operation Environmental Management Plan.
- The *Contractor* shall adhere to Environmental Requirements for contractors/suppliers working at Eskom Medupi Power Station.
- The *Contractor* Employees shall comply Environmental legislations.
- The *Contractor* Employees shall comply Eskom's environmental standards, policies, and procedures where applicable.
- The *Contractor* management shall Inform all staff of their role in managing environmental impacts on site.
- To Ensure incidents must be reported within 24 hours of occurrence.
- To always implement best practice on site during the contract.

3.4 MATERIAL REQUIREMENTS

The *Contractor shall* be responsible for the supply of all materials. Where a material is specified in this document, the material supplied shall be exactly in accordance with the specification. If the *Contractor* intends to use similar or equivalent materials the *Contractor* shall apply in writing to the *Project Manager* for approval thereof.

3.4.1 Materials,

Aggregate, concrete, and river sand must only be sourced from facilities that holds valid environmental approval (e.g., WUL/GA, EA, Mining permit/rights, emergency by law permit) in addition the contractor that should provide the latest external audit for the facility.

3.5 QUALITY REQUIREMENTS

3.5.1 QUALITY MANAGEMENT SYSTEM

The *Contractor* shall be certified and demonstrate compliance to the latest version of the ISO 9001 Quality Management Systems standard.
The *Contractor* shall implement the requirements of the latest revision of the Medupi Quality Specification and have the following documented information as a minimum:

- Quality Policy
- Project Quality Plan
- Operational procedures
- Inspection and test plans, method statements, work instructions, control of nonconformity, corrective action, risk management, etc.)

3.5.2 INSPECTION

The *Contractor* shall be required to maintain inspection databases where all records of inspection are maintained as required in the Medupi Quality Specification.

1. Inspection activities during manufacturing shall be managed according to the Medupi Manufacturing Inspection and Testing Procedure.
2. Inspection activities during construction shall be managed according to the Medupi Site Quality Assurance Control and Verification Procedure.

3.5.3 DATA BOOKS

The *Contractor* shall develop and implement a system for collation or quality verification records, including change management records, design review management records, Manufacturing, Construction and Commissioning Record Books (Data Books) as specified in the Medupi Quality Specification.

Data Books shall be maintained by the *Contractor to* substantiate conformance to product specifications and requirements. All records shall be safely stored (easily retrievable) following the final completion of the works at takeover.

These records shall include as a minimum:
1. Quality Management documentation as specified in the Medupi Quality Specification
2. Safety clearances (to be granted prior commissioning)
3. Construction, layout, and component approvals
4. Routine test certificates
5. Construction and as-built drawings and approvals
6. Statutory certification
7. Data Books (Record Books)

The data books shall be reviewed by the employer for 10%, 30%, 50%, 70% and 100%.
All manufacturing and construction data books shall be completed and approved when the *Contractor* apply for final inspection at construction completion.

At takeover application, all manufacturing, designs, construction, and commissioning data books shall be completed and approved and handed over to the *Employer.*

3.5.4 STORAGE AND PRESERVATION

The *Contractor* shall implement storage and preservation requirements in accordance with the Storage and Preservation Procedure.

3.5.5 TESTING, COMPLETION, COMMISSIONING

3.5.5.1Testing

1 The *Contractor* shall refer to the relevant drawings, standards and specifications for the sampling and testing of materials.
2 The *Contractor* shall, when submitting any work to the Project *Manager* for examination, satisfy himself by testing, measurement and otherwise as may be necessary that the work does in fact meet with the requirements of the specifications.
3 This information shall be submitted with the *Contractor's* request for examination and the *Project Manager* shall be authorised to decide on the number and type of tests, measurements, etc. required to enable him to judge the quality of the work. The submission of this information shall in no way diminish the authority of the Employer to conduct such tests as he may consider necessary to determine the quality of the work performed by the *Contractor,* nor shall he be bound to take account of the *Contractor*'s tests, measurements, etc. should he consider these to be either incorrect or not representative.
4 For reinforced concrete works all testing shall conform to the Medupi specification for structural concrete. Any deviation from the specified testing shall be motivated by the *Contractor* and shall be submitted to the Employer through *Project Manager* for acceptance.
5 The act of passing any completed Works or accepting materials or goods for payment by the *Project Manager* shall not be construed as signifying approval or acceptance thereof. Failure on the part of the *Project Manager* to reject any defective work or material or goods shall not in any way relieve the Contractor of his obligations under the Contract, nor prevent later rejection when such work or material is discovered.
6 The contractor shall provide FAT (Factory Acceptance Test) certificates for any approved testing used in the duration of the contract.

7 The *Contractor* shall allow for FAT, SAT and SIT for approval by the Employer All documentation shall be approved and up to date prior to FAT, SAT and SIT inspections being witnessed by the Employer.
8 The *Contractor* shall prepare ITPs and QCPs for the manufacturing and installation of plant, which shall be submitted to the Employer for review and approval.
9 The Employer shall use such accepted ITPs to indicate intervention points (referred to as hold points) at which he is required to be present, during the manufacturing and installation of the plant at the manufacturer's facility and at the installation site(s).
10 The *Contractor* shall formally invite the Employer to all such hold point inspections, the inspections shall be scheduled by the *Contractor* giving not less than 28 days' notification for the FAT, SAT and SIT and not less than 24 hours' notice for construction hold points.
11 The *Contractor* shall only dispatch such plant to site once the Employer has approved all manufacturing holding points. Plant shall be delivered to site with all completed and appropriately signed quality Databook(s), which shall be submitted to the Employer for his review, approval.

3.5.5.2 Completion And Commissioning

1 The Contractor shall refer to the Employers Policies and Procedures Programme, Progress Reporting and Meeting Requirements, Commissioning Plan as well as procedure PPZ 200 -16714 Commissioning and Completion of Medupi Power Station for detailed requirements for pre-commissioning and commissioning procedures.
2 In line with sub-clause 4.1 of the General Conditions and as amended and amplified in the Particular Conditions, the *Contractor* shall submit to the employer the "as-built" documents and operation and maintenance manuals in accordance with this Specification and sufficient detail for the Employer to operate, maintain, dismantle, reassemble, adjust, and repair the Works. Until these documents and manuals have been submitted by the contractor, such part of Works shall not consider completed for the purposes of taking-over.
3 The *Contractor* shall electronically submit the performance and guarantee tests procedures to the Employer for review and comment, at a date to be agreed, but not less than 112 days prior to start of commissioning. Unless otherwise stated the *Contractor* shall provide three sets of the manuals to enable the Employer to review, comment and request changes as necessary. Copies of all Manuals shall also be provided electronically.

3.5.5.3Manuals

All manuals shall be divided by systems or sections and cross indexed as necessary.

a) Certification Manual

This manual shall contain the approved works certification documentation for all Plant and services as specified in the relevant codes and standards and in this specification and the *Contractor*'s Quality Manual. This manual shall also include all material test certificates. Certificates and test procedures shall be specific to the Plant supplied.

b) Design Manual

This manual shall contain all the design calculations and all Plant and system data sheets and design criteria required under the Contract.

c) Construction Manual

This shall include a comprehensive record of as-built Site construction tests and records. The manual(s) shall be compiled in separate parts to reflect the Plant and services supplied.

d) Commissioning Manual

This manual shall include all the records, certificates and test results arising from the agreed pre-commissioning and commissioning procedures carried out on Site. The performance tests and guarantee test results shall also be included. There is a particular requirement that all commissioned plant/ equipment values be recorded in this manual and subsequently incorporated into the final version of Operating and Maintenance manuals.

e) Operating and Maintenance Manuals

The *Contractor* shall provide three hardcopies and an electronic copy of the preliminary version of all the O&M manuals, including spare parts, properly bound, to enable the Employer's staff to become fully acquainted with the operation, adjustment, and maintenance of the entire works. The manuals shall contain full and explicit instructions in respect of the operation of the works under all operating conditions and the maintenance routines and requirements to be established to maintain the works for optimum performance. The instructions may be divided as appropriate into individual sections and sub-sections as necessary. All section and sub-sections shall be clearly indexed and cross-referenced as required for clarity.

The instructions for the related parts shall be accurate and easy to understand and shall contain the necessary sequence of individual activities. The diagram and drawings associated with the instruction shall be clear and unambiguous.

All sections must contain an introductory description of the item/system including its function and operating criteria and any special features.

The operating instructions shall include at least the following specific procedures/practices:

1. Starting-up
2. Shutting down
3. Operation during fault conditions
4. Surveillance and monitoring of plant.
5. Check lists.
6. Standard readings
7. Operational parameters (especially limiting values in critical areas)
8. Isolating procedures
9. Switching
10. Troubleshooting
11. Fault reporting
12. Normal operational reporting
13. Compliance with requirements for interfacing with grid
14. Safety/security/firefighting first aid
15. General plant standards and guidelines
16. Test procedures
17. Drawings, schematics, logic and wiring diagrams, function.
18. Diagrams, P&IDs, with full implementation of the KKS numbering system.
19. Control and protection

The maintenance instructions shall provide for the three maintenance functional groups - Mechanical, electrical, control and instrumentation and shall include at least the following:

1. A complete and accurate description of the main plant items and systems of the works specific to each function.
2. Detailed maintenance procedures and intervals for all plant items.
3. Assembly and disassembly procedures
4. Spare parts lists and drawings including storage constraints.
5. Use of special tools and equipment
6. Lifting procedures
7. Drawings, detailing tolerances
8. Schematics, logics and wiring diagrams, function diagrams, P&IDs, with full implementation of KKS.
9. Isolating procedures, safety, and codes of safe practice
10. Firefighting / first aid
11. Set-up and calibrating procedures
12. Optimisation of control loops
13. Diagnostics and trouble shooting
14. Specialist maintenance / repair procedures including welding.
15. Materials
16. Test procedures
17. Design clearances and settings with allowable clearances, and Settings for maintenance purposes

It is an essential requirement that all information and Plant data contained in the manual shall be works specific and derived from the design, manufacturers/supplier, and commissioning data of the as-built works. Where the *Contractor* includes standard brochures the installed item of Plant shall be clearly identified.

Handover documentation delivered by the *Contractor* shall consist of all documents relating to the accepted and constructed or delivered and accepted Plant, systems, components, equipment, and items, as identified by the VDSS, and agreed to the *Contractor* and Employer.

The *Contractor* shall ensure that all Plant within his scope of work as delivered and accepted and is consistent with the related handover documentation. The delivery of handover documentation by the *Contractor* may be in successive instalments but shall be completed prior tests on completion. The delivery shall be performed on a per system basis as systems are commissioned and taken over.

3.6 DRAWING REQUIREMENTS

The creation and control of all Engineering Drawings shall be in accordance with the latest revision of 240-86973501 - Engineering Drawing Common Requirements.

i. The *Contractor* shall provide a drawing register.

ii. The *Contractor* shall provide detailed “Approved for Construction” arrangement/dimensional drawings for each part of work to be done. No work will commence without approval of these drawings approved by the Engineering representative of the *Employer.*

iii. After the works have been completed, detailed “As-built” drawings shall be provided by the *Contractor.* The “As-built” drawings are subject to the *Employer’s* Engineering representative comments and approval.

iv. All drawings shall indicate all the new installation/modified parts as well as enough of the existing pipework to which the items are connected. This shall be done in sufficient detail to easily identify the location of the installation.

v. All required drawings shall be prepared in accordance with the requirements as specified in the Engineering Drawing Office and Engineering Drawing Standard. A drawing register which records the drawing’s information shall be maintained by the *Contractor.*

All drawings shall contain the following as a minimum:
1. Description of component with KKS number.
2. Layout of the pipework with dimensions and angles.
3. Bill of materials (BOM) for all components traceable to the layout. BOM should include size, schedule, pressure rating or class, material, quantity etc.
4. Design and operating pressures and temperatures.
5. Proof Pressure Test requirements and pressures.
6. Design standard.
7. All drawing revisions shall be provided as paper copies in original (in all cases at least A3) size as well as provided in pdf format.
8. Initial, surname, PR Eng number and signature of the designer

Engineering documentation shall be prepared in accordance with Documentation Handover List.

3.6.1 AS-BUILT DRAWINGS

For the works where the employer is responsible for the detailed design, the contractor shall be responsible for the provision of the as-built information necessary for the employer to complete the “record drawings”. The as-built information shall be marked up in red neatly on a paper print of the drawing and shall be submitted to the contractors’ Engineer prior to the issue of the Taking-Over Certificate.

For Works where the *Contractor* is responsible for the detailed design, following Taking-Over of the Works the *Contractor* shall submit "As-built" drawings for the Employers’ engineering representative approval. The accepted drawings shall be duly stamped/watermarked "As built ". All As-built drawings shall be supplied per unit as per dates agreed in the VDSS.

3.6.2 MAINTENANCE DRAWINGS

The *Contractor* shall provide assembly drawings for each plant item required, the drawings shall contain sufficient information to enable the Employer's operating staff to dismantle, identify defective parts, fit replacement parts, reassemble and adjust portions of the works, to the limit of what is possible at Site, using obtainable tools, special tools, and spare parts.

3.6.3 EMPLOYERS DRAWINGS

The employers' drawings issued with the Tender Documents stamped 'For Tender's, these are sufficient for the purpose of tendering and shall not be used for construction or ordering of materials.

The employers' drawings issued are for baseline and conceptual design & information purposes. It is the responsibility of the contractor to review, verify and/modify the design and adopt the full accountability of the design, Then issue for construction drawings.

The Construction drawings shall be provided by the contractors' designer after Contract award, these drawings will be issued with due consideration of the programme of production and construction after due consultation with the *Contractor*. The *Contractor* shall indicate the lead times for critical drawings on the programme issued in accordance with sub-Clause 8.3 of the General Conditions and after consultation with the Employer.

3.7 CONFIGURATION MANAGEMENT REQUIREMENTS

3.7.1 Configuration Management Plan

The *Contractor shall* prepare a configuration management (CM) plan utilizing ISO 10007 as a reference guide for the scope of work. The CM plan shall include the following:

1. A complete and comprehensive description of the *Contractor 's* document numbering conventions and revision schema.
2. A description of the electronic data management system(s) that the *Contractor* will use for the management of documents and/or configuration items.
3. A description of the configuration management activities which will be undertaken by the *Contractor as* well as a rough timescale thereof.
4. A description of the baselines that will be established and the content of these baselines.
5. The release procedure for product configuration information.
6. The procedure for the control of changes prior to the establishment of baselines as well as after.
7. The method for processing changes, emanating both internally and from sub-suppliers.
8. The method for collecting, recording, processing, and maintaining the data necessary for producing configuration status accounting records.
9. The definition of the content and format for all configuration status accounting reports.
10. A list of audits which will be conducted to ensure adherence to the CM plan.

3.7.2 Plant Designation

3.7.2.1 Plant Designation System

The *Contractor* shall apply the Kraftwerk-Kennzeichensystem (KKS) codification system to uniquely identify the systems, sub-systems and components constituting the Plant.

The *Contractor* shall apply the following guidelines and standards when codifying plant:
1. The application of KKS plant coding
2. KKS Key Part – Fossil power station
3. Issuing of KKS certificate
4. VGB – B 106 E Part A– KKS Application Commentaries Part A – General
5. VGB – B 106 E Parts B1 – KKS Application Commentaries Part B1_ Mechanical Engineering
6. VGB – B 106 E Part B2 – KKS Application Commentaries Part B2 - Civil Engineering
7. VGB – B 106 E Part B3 - KKS Application Commentaries Part B3_Electrical and C&I Engineering
8. VGB – B 106 E Part B4 - KKS Application Commentaries Part B4 Identification of C&I and Control Tasks

The *Contractor* shall identify all plant indicated or referenced by documentation by the plant's unique KKS codes within the documentation itself.

The *Contractor* shall ensure that the codification assigned to plant is consistently maintained throughout the design cycle, e.g., the KKS codes indicated in the O&M manuals are consistent with the KKS codes indicated in the original process and instrumentation diagram.

The Employer shall supply the *Contractor* with a system-level plant breakdown structure (PBS) of the existing plant at the Site, as well as a preliminary system-level plant breakdown structure of the plant within the *Contractor's* scope at contract initiation. The *Contractor* shall review the PBS to ensure alignment with the *Contractor's* design philosophy and shall expand the PBS to the complete system level (Fn level of the KKS hierarchy). The *Contractor* shall provide a complete system-level PBS with the submission of the process flow diagrams of the plant within the *Contractor's* scope.

The *Contractor* shall codify all equipment, and any components which are required to be codified as per the guidelines and standards referenced in this document. The *Contractor* shall indicate equipment and component codification in drawings and documents indicating or referencing such plant.

The *Contractor* shall submit all KKS codes designated by the *Contractor,* with the documents in which they were originally designated, to the Employer for review. The *Contractor* will remain responsible for ensuring that the codes designated are unique and meet the requirements established by the various standards applicable to the Project. Where any ambiguities or doubts with regards to KKS codification exist, the *Contractor* will engage the Employer for resolution.

3.7.2.2 Plant Labelling

The *Contractor* shall manufacture and install labels according to Employer's Plant Labelling Standard 240-71432150. Any abbreviations to plant descriptions shall be prepared in accordance with the Employer's abbreviation standard, 240-109607332. Detailed nameplate or label lists with the service legends and including the KKS Code shall be prepared by the *Contractor and* submitted to the Employer for review and comment before commencing the manufacture of the labels. On plant areas where labels do not make ergonomically sense please consult site system engineer for guidance as engineering design procedure

3.7.2.3 Plant Designation within Documentation

The *Contractor* shall prepare a list of KKS designations allocated to components for each scope of delivery or system (this list shall be referred to as equipment list in the rest of this document for simplicity's sake, but includes documents such as cable schedules, valve schedules, etc.). The equipment list shall be submitted with the original implementation documentation describing the design of the system (e.g., process and instrumentation diagram, single line diagram, etc.).

The *Contractor* shall ensure that the equipment list accurately represents the implementation documentation which it accompanies.
The content of the lists will be agreed to per discipline with the Employer. As a minimum, the equipment list shall include:

1. The KKS designation of all components within the relevant scope or system.
2. The full verbal description of each component, compiled according to the standards referenced in this document.
3. The abbreviated description of each component, utilising abbreviations as listed in the referenced project abbreviation list and abbreviated to a number of characters as required by the project digital control system (DCS) and as per the label requirements in Medupi Label specification, 200-3340.
4. The approval status of each component, in alignment with the list of approval statuses specified for document.

3.7.3 Document Submission

All documents shall be submitted to the Eskom Documentation Centre. The language of all documentation is required to be in English.

The *Contractor* shall submit Master Document List, with document titles, document revision, status, transmittal details and project phase.

3.7.4 Transmittal

The *Contractor* shall list all project documents (soft copies and hard copies) for submittal on the transmittal with the following metadata fields:

1. Title of the document
2. Document Unique Identification number
3. Revision number
4. Name of Discipline
5. Reason for issuing/submission.
6. Sender's detail
7. Sent date.
8. Recipient's Details
9. Date received.
10. Quantity of documentation referenced on the transmittal.
11. Number of copies
12. Format/medium submitted (e.g.: paper, DVD, etc.)
13. Sender signature
14. Recipient signature, once submitted, to acknowledge receipt.

3.7.5 Document Submittal Schedule

1. Within two (2) weeks of the *starting date,* the *Contractor* submits a comprehensive time schedule for submission of all documentation including drawings, design calculations, schematics, wiring tables/diagrams, manuals, procedures, quality control plans and any other information for the review and acceptance by the *Project Manager*. This document is referred to as the Vendor Document Submission Schedule (VDSS).
2. As a rule, all documents are to be submitted as early as possible to allow for comprehensive review, but not later than 2 months before the start of manufacturing or on-site construction.
3. All designs, including drawings and design calculations are to be submitted at regular intervals to ensure a steady flow of submissions.
4. All documents are submitted in stages as the design process unfolds starting with the project design basis. This is to ensure that the *Employer* has sufficient time to gain an understanding of all sub designs and is not rushed into reviewing large submissions in a very short period. It also reduces the possibility of rework due to the incorrect basis for designs.
5. The *Employer* shall complete the review and accept or reject with comment, the above documentation within fourteen (14) days of receipt. If documents are re-submitted after changes, two copies are submitted. One with the updates / changes clearly indicated and another “clean” copy to facilitate fast and efficient review of the resubmission.
6. All design documentation is submitted before the commencement of construction, and red line drawings and documentation is submitted prior to pre-commissioning to enable the *Employer* to perform the pre commissioning review as per the *Employer’s* design review procedure 240-53113685.
7. The *Contractor* is required to submit the VDSS as per agreed dates, to the *Employer’s* Documentation Centres, where the *Employer* will pre-allocate document numbers on the VDSS and submit back to the *Contractor.*
8. The VDSS is revisable, and changes are discussed and agreed upon by all parties and correctly documented. Typical changes in the VDSS can be additional documentation to be submitted, changes in submission dates or corrections in documentation descriptions, document numbers, etc.
9. The VDSS shall indicate the format of documents to be submitted. The *Employer* monitors the schedule i.e., creates a document register that will be used to track submission progress of documentation by the *Contractor* as per the committed dates on the VDSS.
10. The *Contractor* updates and submits the VDSS to the *Project Manager* on a weekly basis. A copy of the updated VDSS is also to be included in the *Contractor’s* monthly Progress Report

The *Contractor shall* submit the Vendor Document Submission Schedule (VDSS) as per agreed dates to the Eskom Documentation Centre and to the Project Manager. Eskom shall pre-allocate document numbers on the VDSS and send back to the *Contractor.*

3.7.6 Email Subject

The email subject shall as a minimum have the following:
(Project Name_Discipline_Subject)
The *Contractor* shall submit documentation to the Eskom Representative as well as the Project's Documentation Centre in the following media:

1. Electronic copies shall be submitted to Eskom Documentation Centre through generic email address as specified in Controlled of Drawings Procedure. Electronic copies too large for email shall be delivered on CD/DVD, large file transfer protocol and/or hard drives to the Project Documentation Centre. A notification email, with the transmittal note attached, shall be sent to the project generic email address. The Representative shall be copied on the email as well.
2. Hard copies shall be submitted to the Eskom Representative accompanied by the Transmittal Note.
3. The format of the final documentation handover shall be specified in the Vendor Document Submittal Schedule.

3.7.7 Documentation requirements

All documents supplied by the *Contractor* shall be subject to Eskom's approval. Documents such as QCP's, Method Statements and other documents impacting the work shall be approved by the *Employer* at least 3 working days prior to commencement of the Works.

Each revision of a document or drawing shall be accompanied with a list of the comments made by the *Employer* on the previous revision if applicable and the response/corrective action taken by the *Contractor.* Changes shall be recorded in a revision table contained on/in each drawing/document.

Documents and drawings shall indicate the *Employer's* drawing number as allocated by the *Employer*. The *Contractor* may have his own internal document or drawing number on the document or drawing, but where reference is made among documents or drawings, the *Employer's* number shall be used.

The *Contractor shall* compile a complete data book for all work done during design, manufacturing, construction, and commission containing the following as a minimum if applicable:

1. Scope of work
2. Approved "As built" drawings (P&ID's, isometric drawings, GA's, Detail design drawings)
   3. Design calculations
4. Approved QCP / ITP's (each separate section shall have its own ITPs with a section for system engineer, Quality, and construction sign)
5. Inspection reports
6. Pipe ovality reports if applicable.
7. Material summary that gives full traceability between components used, drawings and material certificates.
8. All material certificates for pipes, fittings and all components used.
9. Pressure test certificate and the calibration certificates of the gauges used.
10. Pressure test procedures
11. The manufacturer's/repairer's certificate as defined in PER.
12. All CAR's and corrective actions
13. Operating Philosophy including
14. Alarm list
15. Parts catalogue

16. Maintenance manual
17. Storage, packing and transportation instructions.
18. Equipment list
19. Auxiliary Power Schedule
20. HAZOP Reports
21. HAZLOC
22. FMECA and RAM studies
23. Hydraulic Analysis Calculations
24. Fire Rational
25. Load Schedules
26. Wiring Diagrams

For consistency it is important that all documents used within the project follow the same layout, style, and formatting standard therefore the *Contractor* shall ensure that the Document and Record Management Procedure is used for any documentation requirements.

3.7.8 General Requirement

The *Contractor* shall include the *Employer*'s drawing number in the drawing title block. This requirement only applies to design drawings developed by the *Contractor* and his *Sub-Contractor*'s. It shall not apply to drawings developed by manufacturers for equipment and material such as valves, instruments, etc. Drawing numbers shall be assigned by the Employer as drawings are developed.

The project name shall be listed on all drawings, including manufacturers' drawings. A separate sheet may be attached to the submittal if needed to adequately list all tag numbers associated with the drawings such as valves or instruments which may have numerous tag numbers associated with it.

The language of all documentation shall be in the English language. The units of measure shall be metric.

The *Contractor* retains project design calculations and information for the entire life cycle of the plant and provides these to the *Employer* on prior written notice at any time notwithstanding the expiry or termination of the contract.

3.7.9 Engineering Change Management

All Design change management shall be performed in accordance with the latest revision of the Medupi Engineering Change Management Procedure and the *Employer* shall ensure that *Contractor is* provided with latest revisions of this procedure. Any uncertainty regarding this procedure shall be clarified with the *Employer* and clarification updates should be reflected in updated versions of this procedure.

3.8 PRESSURE TEST REQUIREMENTS

The fire water and potable water lines shall be pressure tested to determine if there are any leaks. The fire water and potable water lines do not operate under high pressure however, when pressure tests are done the following shall apply:

1. All pressure tests shall be conducted with water i.e., hydraulic pressure tests.
2. Pressure test procedure shall be submitted to and approved by Employer before pressure test can commence. Pressure test procedures shall also be included in the data book.
3. Two pressure gauges shall be used for the pressure test.
4. All pressure gauges shall have valid calibration certificates prepared by a SANAS accredited pressure laboratory for all locally manufactured items. The maximum validity of the calibration certificates shall be 6 months.
5. Proper venting shall take place and all air pockets shall be vented. Method statement shall be provided.
6. The pressure inside the equipment under test shall be increased to a value of the specified test pressure as defined by the ASME B31.1 code. Thereafter, the pressure shall be increased in steps of approximately 10 % per minute of the specified test pressure until the full test pressure is reached. The piping system shall be held at the test pressure for a period of at least 30 min.
7. After the test has been completed a pressure test certificate shall be issued which shall be included in the data book.
8. All piping shall be chemically cleaned to remove the contaminants.

3.9 TRAINING REQUREMENTS

1. Training for the use of the Weighbridge and Gate 4 Access Control Building shall be provided to relevant departments within the station for the effective and efficient operation.
2. Training with associated training manuals (including special tools) for the operation of the weighbridge system shall be provided to the client for effective and efficient operation. The *Contractor* shall provide a training schedule for classroom training, practical and exams.
3. Training will be required for HVAC maintenance team on the operations of the installed HVAC system by the contractor.
4. Training will be required for C&I Maintenance team to do the weighbridge scale Calibrations and verification tests.

3.10 CIVIL & STRUCTURAL SKILLS TRANSFER

1. The *Contractor's* designer is required to provide skills transfer for 5 civil engineers from the *Employer's* team. The *Contractor's* designer makes available the design tools, and office space as required to include the *Employer's* engineers in their design activities. The Consultant's senior design engineer is required to provide supervision and guidance to the *Employer's* engineers for the duration of contract. The logistical aspects will be confirmed after appointment.

2. The design engineer will be responsible to assist the Eskom civil engineers to meet ECSA outcomes for professional registration including but not limited to reviewing and signing ECSA Training and Experiential Reports for tasks completed as part of the Skills transfer. The program for meeting the outcomes will be discussed and agreed upon between the parties (Design engineer and Eskom civil engineers) before contract award.

4 DESCRIPTION OF THE WORKS

4.1 SYSTEM OVERVIEW

The project shall entail design, construction, procure, supply, installation, and commissioning of the Weighbridge inclusive of the Access Control Building and Weighbridge Control room with all associated facilities at Medupi power station as outlined in the scope of works included but not limited to the following:

4.1.1 Access Control Building Architectural, Civil and Structural

The *Contractor* shall design and construct an Access Control building approximately 160 m2 comprising of concrete walls, brick walls on reinforced concrete foundations, structural steel columns and a sheet cladded roof, building services and incidental works. The building shall mainly be constructed on natural ground level.

4.1.2 Weighbridge

The *Contractor* shall supply and install two bi-directional weighbridges with a minimum rated capacity of 60 metric tons (60,000 kg), and the scale platform's footprint shall measure 24m x 3m (minimum). The *Contractor* shall be responsible for the structural and mechanical design, construction, fabrication, installation, testing and certification of the weighbridges and all accessories.

4.1.3 Weighbridge Control Room Building Architectural, Civil and Structural

The *Contractor* shall design and construct a control room building comprising of concrete walls, brick walls on reinforced concrete foundations and roof structure, building services and incidental works.

4.1.4 Small Power and Lighting

The *Contractor* shall provide and install all small power and lighting for all buildings and high mast lighting.

4.1.5 Weighbridge Control System

A Workstation shall be provided in the control room and integrated to the weighbridge controller system to perform local control and monitoring, and for automatic comprehensive data logging and archiving with detailed analysis and reporting for maintenance management and accounting purposes. There will be overview screens with detailed mimics one or 2 levels deep.

Operational Areas of control shall be managed by a security and password protection system, implemented at the operator station level when the operator logs on. This allows operators to have access to control weighbridge system. All operator actions shall be logged and may be interrogated during run-time or historically, by area, operator, and console. Supervisors and engineers shall also have higher levels of access to additional functions that are not available to a console operator.

For system time synchronization, NTP (Network time protocol via Ethernet), to Medupi time servers is possible but will completely be in Contractor's scope to connect to nearest available connecting point. Contractor is at liberty to also provide own GPS time input and antenna.

Local indication and alarm indications shall also be provided for by Contractor.

Local control stations for the Weighbridge at the local point of operations will be provided by the contractor which will be integrated to the computer and workstation in the control room.

As a minimum, the weighbridge control and accounting system should be able to:

I. Identify or distinguish the different types of payloads or material being weighed

ii. Automatically identify and log the vehicle being weighed

iii. Log accurately time of measurement or time stamp the measurement

iv. Log operator operating the system at the time of measurements

v. Alarm and log any discrepancies or faults as they arise and even log the fault during the measuring process.

vi. Provide detailed reports and trends per vehicle, per type of material weighed – the structure of these reports will be as agreed with Employer during detail design of project.

vii. Store all logged data, events, video footage and reports for a period of at least five years.

viii. All archived or stored data should be able to be exported to a .csv file without requiring reprogramming of the control system – it should be exportable through few simple steps.

ix. The archived or stored data should be filterable using any criteria possible

x. The system should also be able to backup and restore all data onto a removable storage media without in a few simple steps without having to reprogramme the control system.

The weighbridge control system shall also be able to be interfaced to existing plant information system and future information system through as a minimum an OPC connection.

4.1.6 Fire Protection.

The Contractor is responsible for the detailed design, supply, installation, testing and commissioning and sign off (PEC) of the fire detection system that includes the provision and installation of fire panels, Smoke detectors, Optical smoke detectors, Heat detectors, Manual call points, Monitoring Controllers, Isolator for short circuit protection, CO sensors, Contact Coupler, Strobe lights, and any other requirements as detailed in the Employers Requirements Specification and drawings.

4.1.7 Access Control

The Contractor is responsible for the detailed design, supply, installation, testing and commissioning of the Access Control System that includes the provision and installation of LCD monitors, Operator Workstation for CCTV access control, Photo ID Workstation, Photo ID Printer, Keyboards, Mouse / joystick for controlling PTZ cameras and any other requirements as detailed in the Employers Requirements Specification and drawings.

4.1.8 Closed Circuit Television System

The Contractor is responsible for the detailed design, supply, installation, testing and commissioning of the CCTV that includes the provision and installation of CCTV cameras, PTZ CCTV cameras, CCTV camera lens, CCTV camera housings, CCTV camera housing mountings, CCTV camera brackets, Poles for fitting CCTV cameras, Digital Video Recorders (DVR's) including CD / DVD writer, Mouse / joy stick, Power supplies and any other requirements as detailed in the Employers Requirements Specification and drawings.

4.1.9 HVAC Works

The *Contractor* is responsible for detailed design, supply, installation, testing and commissioning of the HVAC works for the Gate 4 Access Control building and Weighbridge Control room and any other requirements as detailed in the scope of work. These works to be fully integrated with CBMS and Fire protection systems.

4.1.10 Road Works

Th contractor is responsible for the detailed design and construct of new road works and modification of the existing road to fit the works of the weighbridge. The work will include ripping of existing road surface, additional fill, and layer work as well as surfacing of the road, storm water and road markings. Designated parking areas. Due to widening of the existing road, extension of the existing culvert must be constructed. To incorporate the new road layout, to the existing infrastructures at the entrance to the site will be extended and any other requirements as detailed in this document.

4.1.11 Landscaping

Landscaping of a small area at the access Control building as well as erosion protection of slopes is included, and any other requirements as detailed in the scope of work.

4.1.12 Services

Services to the buildings include fire water, potable water as well as sewer. These services will be connected to existing services at positions provided and any other requirements as detailed in the scope of work.

4.1.13 Access Control Fencing at Gate 4

The detailed design, procure, supply, installation, testing and commissioning of the three-layer perimeter fence system including the electric gate and manual gates for the Gate 4 Access Control building as per the NPK requirements and any other requirements as detailed in the scope of work.

4.2 SCOPE OF WORK

The scope of work for the project entails design, construction, procure, supply, installation, and commissioning, testing and handover of the Weighbridge inclusive of the Access Control Building and Weighbridge Control room with all associated facilities and infrastructure. These include but not limited to:

1. Site inspection and topographical survey of the areas (as deemed necessary by the Contractor).

2. Geotechnical investigation and earthworks deemed required by the Contractor including but not limited to road works, buildings, weighbridge platform, high mast lights, pipelines, cables sleeves and any other requirements for underground services and any other areas deemed required.

3. Design & Construction with commissioning of a new roads the work will but not limited to include ripping of existing road surface, additional fill, and layer-work as well as surfacing

of the road, storm water, road markings and any other requirements as detailed in the scope of work.

4. Design, Construction and commissioning of the landscaping designs in the small area at the access Control building as well as erosion protection of slopes as detailed in the scope of work.

5. The detailed design, procure, supply, installation, testing and commissioning of the HVAC system for the Gate 4 Access Control building and weighbridge control room and any other requirements as detailed in the scope of work.

6. The detailed design, supply, installation, testing and commissioning of the fire protection system that includes the provision and installation of fire extinguishers and hose reels, and any other requirements as detailed in the scope of work.

7. The design, procurement, supply, installation, testing and commissioning of all small power and lighting for all buildings.

8. The detailed design, procure, supply, installation, testing and commissioning of the two bi-directional weighbridges with a minimum rated capacity of 60 metric tons (60,000 kg), and the scale platform's footprint shall measure 24m x 3m (minimum). In addition, the structural and mechanical detailed design, fabrication, installation, testing and certification of the weighbridges and all accessories.

9. The detailed design, construction and commissioning of the Access Control Building and Weighbridge Control Room Building comprising of concrete walls, brickwork walls on reinforced concrete foundations with structural steel columns and roof structure and a sheet cladded roof and any other requirements as detailed in the scope of works.

10. Design, supply and Installation and construction and commissioning of Services to the buildings include fire water, potable water as well as sewer and any.

11. Design, Construction and commissioning of the storm water drainage system and connection to existing storm water drainage system and any other requirements as detailed in the scope of work.

12. The detailed design, procure, supply, installation, testing and commissioning of the three-layer perimeter fence system including the electric gate and manual gates for the Gate 4 Access Control building as per the NPK requirements and any other requirements as detailed in the scope of work.

13. The design, construction, and commissioning of all incidental works.

14. Hazardous Zone classification based on design.

15. Consumable spare parts, including the specialist tools, first fill and consumables, lubricants and chemicals required for erection and commissioning up to the issuing of the Completion Certificate for the works by the Employer.

16. Earthing and lightning protection of the steelworks, buildings, weighbridges, fencing and any other requirements as detailed in the Employers Requirements Specification.

17. All electrical works for a fully functional system.

18. All control and instrumentation work to make a fully functional system.

Design integration

The *Contractor* shall submit the design to the Project Manager for acceptance in a design pack. Employer engineering to do design review and comments given accordingly.

The *Contractor* and the OEM shall identify any discrepancies that could lead to shortcomings in the design and makes the Employer aware of such discrepancies and provides recommendations, where applicable.

The *Contractor shall* act on such discrepancies.

Any discrepancies found in the design after approval of the first submission shall be the responsibility of the *Contractor.*

The design pack shall be eligible for approval once it consists of the following but not limited to; -

1. Design report & calculations of the access control building.
2. Design report & calculations of mechanical equipment.
3. Detailed design of the road works.
4. Structural supports calculations and drawings for weighbridges and platform.
5. Heat load calculations for the sizing of the HVAC System.
6. Issue for construction drawings.
7. As built (Isometric, P&ID's, and General Arrangement Drawings).
8. Pressure test procedures.
9. Methodology statements.
10. Quality Control Plans (QCP).
11. Acceptance test procedures.
12. HAZOP Reports.
13. HAZLOC.
14. FMECA and RAM studies.
15. Fire Rational.
16. Load Schedules.
17. Wiring Diagrams.

All submitted design calculations and drawings shall be signed by a Professional Engineer with ECSA registration number stated on drawing. The *Contractor* shall supply the copy of ECSA registration for the Professional Engineer.

The drawings forming part of this document are issued for Information only to the *Contractor* to indicate the *Employer's* proposed Conceptual Design for the Works.

The *Contractor* shall verify and optimise the *Employer's* Design and takes full accountability and liability for the all the Designs in this scope.

5 MECHANICAL WORKS

5.1 HVAC WORKS

The *Contractor* shall provide for the Weighbridge Control Room and Gate House buildings ventilation and air-conditioning through detail design, supply and installation of louvers, ventilation equipment and associated ducting, and air conditioning by means of direct expansion inverter units for the substation capable to control the ambient conditions. The performance standards and technical requirements for the HVAC Works are set out in the following specifications:

- **240-102547991** General Technical Specification for HVAC Systems Standard
- **240-701646423** Eskom HVAC Design guideline

The *Contractor* shall study these standards and procedures to understand the requirements and constraints pertaining execution of the HVAC Works. Where applicability of these standards and procedures is not clear the *Contractor* shall query such with Employer before undertaking Works that are the subject of these documents.

Size and space constraints are stipulated by the tender HVAC drawings provided by the Employer, where the *Contractor*'s equipment and works may have an effect on the space and arrangement the *Contractor* shall give adequate advance notice in writing including details of such items to allow the Employer to similarly modify the drawings.

The *Contractor* shall submit the following documentation for approval by the Employer.

1. Control drawings showing zoning, fire interface and connection and smoke extract functionality.
2. Detailed equipment list: (template supplied by the Employer).
3. Inspection Test Plans.
4. General Arrangement drawings.
5. Alarm list: (template supplied by the Employer) and
6. Air, chilled water, and Cooling water P&IDs including control loops. Electrical single line diagrams for the MCC (summary of loads on the MCC)
7. Electrical schematic diagrams for the MCC

The *Contractor* shall further:

1. Make use of 'EED_GTD_C&I_006 (200-71827)' to ensure sufficient alarm management, where alarms shall be prioritised and rationalised to achieve the following:
    a) Minimal false and nuisance alarms.
    b) Distinguish between operational and maintenance alarms.
    c) Allow for easy operator navigation and understanding of alarms.
2. Provide electrical works as indicated in the Works HVAC specification.
3. Provide Operation & Maintenance Manuals and Training Manuals
4. Complete Aux power schedule for all permanent power requirements.
5. Complete the following documentation and submit for approval:
    a) Virtual Signals List (template supplied by the Employer).
    b) Alarm Schedule – including alarm priority, recommended operator response and response times (template supplied by the Employer).
    c) Drive and Actuator Schedule (template supplied by the Employer).
    d) Instrument Schedule (template supplied by the Employer).
    e) Cable Schedule (template supplied by the Employer).

f) General Arrangements of cubicles.
g) Hook Up Diagrams.
h) Panel Interface List.
i) Termination Diagrams.
j) Equipment List (of which drive, and actuator and instrument schedules will be a subset); k) Inspection Test Plans.

5.2 FIRE PROTECTION

The *Contractor* is responsible for the detailed design, supply, installation, testing and commissioning of the fire protection system that includes the provision and installation of fire extinguishers and hose reels, and any other requirements as detailed in the Employers Requirements Specification and drawings.

The *Contractor* shall refer to the Employers Fire Protection & Life Safety Design Standard, 24054937450 this standard includes requirements and constraints pertaining execution of the fire protection Works. Where applicability of this standards is not clear the Contractor shall query such with Employer before undertaking Works that are the subject of this standard.

5.2.1 Design Approach

The Eskom Fire Protection/Detection Assessment Standard gives the possible design approaches that can be taken during a fire system design. This scope has been evaluated and is clearly defined in the Eskom Fire Protection standard. The scope will follow the legislative route of “Deem to Satisfy” (DTS) by complying with the requirements of SANS 10089-3.

The *Contractor* shall design, procure, supplies, install and commission the fire protection for the complete works.

The *Contractor* shall include as a minimum the following:
1. Hazardous Zone Classification as per HAZLOC.
2. Portable fire extinguishers covering all fire risk areas, positioned at strategic fire points.
3. Passive fire protection measures such as separation of flammables/ combustibles from ignition sources, enclosure and/or compartment of fire risks, fire-sealing of service penetrations, and coating of cables in potentially fire exposed areas.
4. Provision of an emergency lighting system, emergency escape routes and exits.
5. Safety signage as per SANS 10089-3.

Fire protection design shall conform to the national building regulations and fire protection design standards and to be certified by a Professionally register and competent Engineer.

5.2.2 Fire Risk Evaluation

A fire risk evaluation shall be initiated early in the design process, to ensure that the fire prevention and fire protection recommendations as described in SANS have been evaluated in view of the plant-specific considerations regarding design layout and anticipated operating requirements.

The evaluation shall result in a list of recommended fire prevention features to be provided based on an acceptable means for separation or control of common and special hazards, the control or elimination of ignition sources, and the suppression of fires. The fire water piping must be installed,

connected to the potable water lined and commissioned as detailed in the Employers Requirements Specification and drawings.

5.2.3 Hoses

New hoses shall be marked to indicate compliance with SANS standards. Hoses shall not exceed a length that would cause a hazard. Hose reach is typically between 3 and 4 m from the dispenser housing. The use of hoses with reach in excess of this shall be subject to a risk assessment. Manufacturers shall provide guidance on how such longer hoses can be protected from damage.

5.2.4 Water supplies

The contractor shall connect to existing water supplies in the area.

5.3 POTABLE WATER

The *Contractor shall* supply, procure, manufacture, install and commission a potable water piping and fittings to supply potable water to the buildings. Potable water system shall comply with SANS 62/ SANS 719. The *Contractor* shall pressure test potable water piping from potable water tie inn point to the buildings.

The on-site commissioning of the potable water distribution system shall be conducted as per Employer's on-site commissioning for low pressure services 240-56356376

5.3.1 Pressure Test Requirements

It is required for the piping to be pressure tested to determine if there are any leaks. When pressure tests are done the following shall apply:

1. All pressure tests to be done with water i.e., hydraulic pressure tests.
2. Pressure test procedure must be submitted to and approved by Employer before pressure test can commence. Pressure test procedure must also be included in the data book.
3. Two pressure gauges shall be used for the pressure test.
4. All Pressure gauges must have valid calibration certificates done by a SANAS accredited pressure laboratory for all locally manufactured items. The maximum validity of the calibration certificates is 6 months.
5. It must be ensured that proper venting takes place and that all air pockets have been vented. Method statement shall be provided.

The pressure inside the equipment under test shall be increased to a value of the specified test pressure as defined by the code. Thereafter, the pressure shall be increased in steps of approximately 10 % per minute of the specified test pressure until the full test pressure is reached. The piping system shall be held at the test pressure for a period of at least 30 min.

6. After the test has been completed a pressure test certificate must be issued which is included in the data book.

5.4 WEIGHBRIDGE SCALE TESTING AND CALIBRATION

The tests specified below shall be performed upon completion of the scale installation. This testing and the associated costs shall form part of the scope of work to be performed. Any additional recommended tests may be proposed for consideration. The initial set of tests forms part of

installation cost. In addition, the supplier will be responsible for all costs associated with correcting deficiencies and retesting in the event of a test failure.

Tests to be performed as part of the scale calibration shall include, but not be limited to:

1. Zero Load Error test,
2. End-Middle-End test,
3. Eccentric Loading test, and
4. Accuracy Test.

Table 1: Weighbridge Scale Tests

Test to be performed	According to Requirement	Performed By
Calibration of the weighbridge scale.	Trade Metrology Act, 1973 (Act No. 77 of 1973)	Supplier or alternative accredited organization.
Control room scale controllers and PLC functionality and emergency recovery tests.	-	Supplier demonstration
Data management system functionality and emergency recovery tests.	-	Supplier demonstration
Global scale system electronics & electrical systems functionality.	-	Supplier demonstration
Load-cell performance evaluation reports shall be produced by the Supplier.	SANS 1838-1	NRCS

An experienced, competent, and authorized Supplier's representative shall calibrate each weighbridge scale as part of the scale and weighbridge control system supply.
This shall include the provision of all certified test weights and shall provide the required scale certification for capacity and accuracy as required in terms of the Trade Metrology Act, 1973 (Act No. 77 of 1973), the calibration certificate must SANAS Accredited institution, as included in the initial contracted cost.

5.5 MARKING, LABELLING AND PACKAGING

5.5.1 Weighbridge Scale Capacity Marking

The maximum permissible safe load for which the scale is constructed shall be conspicuously and indelibly marked on an essential part of the instrument or on a metal plate permanently secured to it.
Where the maximum safe load on the load receptor of a vehicle scale is less than the capacity of the instrument, such maximum safe load shall be marked on the scale in the same manner as the capacity, adjacent to the capacity marking.

6 Control and Instrumentation Works

1. The weighbridge scale shall be of the fully electronic type, utilizing precision load cells, be furnished with all the associated hardware and software, and all other accessories required for a complete fully functional weighbridge scale and weighbridge control system.
2. Additionally, the weighbridge scale shall be furnished with:
   a) Automatic weight recording controls,
   b) Local (inside the weighbridge control room) and remote (adjacent to the weigh-out weighbridge scale) ticket printer,
   c) Local inventory tracking and invoice printing system and software,

3. There shall be one weighbridge control room for the weighbridge control system. The weighbridge control room shall be situated such that the operator has full view of the entire weighbridge operation but clear of truck traffic.
4. The weighbridge control system shall operate off a dedicated PLC which shall operate the entire weighbridge system and provide all the HMI requirements. The PLC shall be provided with the relevant software and network interface to allow for remote access and local data transfer by the operator.
5. The PLC shall have a local data historian with 2-month data retention capability. The data stored by the historian will include the weight measurements and corresponding date, time and licence number plate of the truck and all CCTV footage.

HMI requirements:

1. The operator will see on a dedicated screen, as mimics, all the weighbridges and for each weighbridge the licence number plate of the truck being automatically weighed, and the weight measurement.
2. Weight display at each end of the bi-directional weighbridge scale platform such that it can be seen by the truck drivers.
3. The operator shall also have the ability to view all the CCTV footage at once, and redundant links for bi-directional weighbridge scale platform can be activated once required,
4. The operator will see on a dedicated screen, all the CCTV footage of the weigh-in trucks licence plate,
5. The operator will see on a dedicated screen, all the CCTV footage of the weigh-out trucks licence plate,
6. The operator will see on a dedicated screen, all the CCTV footage of the weigh-out trucks load box,
7. The operator will on a dedicated screen be able to view a selected single CCTV footage as described in bullet points 3, 4 & 5 above.
8. Indication to the truck driver by red and green traffic signals, which shall be controlled and operated from the weighbridge control system. The traffic lights shall be located near both ends of the bi-directional weighbridge scale so they can be seen by the truck driver.
9. Where a truck licence number plate does not read automatically, an ERROR indication shall be made to the operator due to no licence number plate being found, while a measurement is being taken, the operator shall have the ability to manually enter the licence plate number, and receive indication that the weight measurement and licence plate number are linked, then the operator manually by “push button” allows the truck to depart from the weighbridge.

10. Then, when that truck returns for weigh-out, an ERROR is shown because no licence number plate was found while a measurement is being taken then the operator shall have

the ability to capture the licence plate number manually for that weighbridge, and receive an indication that the weight measurement and number plate are linked, then the operator manually by “push button” allows the truck driver to receive the ticket and proceed to depart from the weighbridge. The weighbridge control system will not allow a truck to exit a weighbridge until the operator has captured the license plate number.

11. In the case of a weighbridge scale utilized for weigh-out purposes, the weighbridge scale shall include a ticket printing tower mounted adjacent to the scale platform, accessible from both sides of each weighbridge scale. Upon weigh-out, the truck driver will receive indication that the weight is successfully captured, and the ticket may be taken. The truck driver will then manually by “push button” have the ticket printed. Once the ticket is printed the truck driver will receive indication to proceed to exit the weighbridge scale.
12. The trucks may or may not necessarily enter and exit the plant (and thus the scale) in any specific order, so the scale controls and associated components shall be able to automatically associate each individual weighing activity with a specific truck designation and shall further designate the weight as a gross or tare weight.
13. The weighbridge shall employ strain gauge load cells along with lateral positioning elements to minimize loads or forces other than vertical gravitational forces. The load cells: shall be of heavy-duty corrosion resistant construction, shall be hermetically sealed to ensure protection if submersed in liquid, shall be provided with surge voltage protection (including lightning protection), shall have waterproof connector elements included for connection to field wiring, and shall have a quick release mounting design for ease of maintenance.
14. The output signal from the electronic load cells shall be measured and amplified by solid-state circuitry and converted to a weight value.
15. One scale controller unit shall be provided for the weighbridge scale. It shall be enabled with a power-on indication, scale-in-use indication, test-in-progress indication, and initiation switches for the required modes. When the scale controller is powered up, it shall automatically go through a test mode. In the test mode, all parameters shall be checked, and an error code displayed if a problem is found. A complete list of error codes and suggested solutions shall be included in the scale documentation. If no problem is found, the controller shall function as required. The controller unit shall have a built-in display screen capable of displaying a six-digit digital readout (minimum), in kilograms, and shall interface fully with a local (in the weighbridge control room) weighbridge control system PLC.
16. The weighbridge scale shall have built-in predictive diagnostics, capable of identifying load cell problems or failures. It shall enable some degree of pre-failure warning notification in order to minimize unplanned downtime. In the event of a load cell problem or failure, the diagnostics system shall identify the problem load cell, and shall alert the weighbridge control room-based operator via the load cell controller display. The weighbridge control system shall have capabilities allowing for remote monitoring and troubleshooting by the scale system OEM.
17. In the weigh-out direction of the weighbridge a vertically oriented safety trip system shall be provided in such a manner that if an approaching truck has its load box(s) in the unloading position, warning horns and lights will be activated alerting the truck driver.
18. The electronic and electrical equipment employed for use with the weighbridge scale shall be suitably IP rated in accordance with the local environmental rating.

6.1 INVOICE SYSTEM

Important transaction information that shall be captured both automatically via the software with input from the weighing controller and the RFID system, or manually via operator input into the local PLC, shall include, but not be limited to:

1. Vehicle registration
2. Vehicle license expiry
3. Driver ID
4. Driver name
5. Driver tag
6. Driver license expiry
7. Driver Eskom license
8. SAP contract reference
9. SAP purchase order reference
10. Stockpile or product storage site number
11. Transaction date and time (automatic)
12. Route for delivery (trip info)
13. Hauled product sourced.
14. Hauled product destination.
15. Weight measured at source/load point scale.
16. Weight measured on scale (automatic)
17. Weighbridge site name (automatic)
18. Scale operator ID (automatic – operator manual updatable)

All data shall also be automatically backed up via the network to a remote PC. Inventory control software shall also be provided for the remote PC to enable remote printing of inventory reports in a customizable fashion. The supplied weighbridge scale inventory software shall have Microsoft Excel™ export capability to enable remote viewing, format editing, and back-up storage of data. An automated ticket printing system shall be furnished and installed. The ticket printing system shall be capable of printing an invoice or ticket that details the critical information pertaining to the weighing operation being performed on the scale, as detailed in the list above. The printer shall be capable of printing multiple copies and shall be programmed to print the desired number of copies, and to include the ability add additional information which may be required in the future.

6.2 CLOSED CIRCUIT TELEVISION SYSTEM

(1) The Closed-Circuit Television (CCTV) System shall be provided by the Contractor and shall interface with the CBMS. The Contractor shall provide all hardware, software and cabling required for the CCTV system as part of the Works.
(2) The CCTV system shall be fully integrated into the CBMS, as well as being able to operate as an independent system.
(3) All indoor cameras shall be ceiling mounted where possible. If not, possible they shall be wall mounted. Outdoor cameras can be wall mounted where applicable with the necessary cooling system (preferably natural cooling). All CCTV cameras shall require low maintenance.
(4) Where cameras are required to be pole mounted in outdoor locations, the Contractor shall design, supply, and install all necessary equipment in order to satisfy the requirement. This includes the pole and its fittings as well a cooling system.

(5) If the pole mounted outdoor cameras require external power, the Contractor's scope shall include furnishing and installing an armoured power cable, suitable for direct burying, from the camera to a substation distribution board, furnished by others.
(6) The Contractor shall also design and install the cabling system from the camera location to the applicable access point, which shall include direct-buried cable.
(7) Any devices required between the Contractor's CCTV system and the CBMS shall be provided and installed by the Contractor. The Contractor shall provide trenching if necessary.
(8) Contractor to provide Video Management System which will include archiving or storing of all recordings for a period of at least 5 years. The storing and retrieving of each recording should be such that it is simple to retrieve any recording stored.

6.3 FIRE DETECTION SYSTEM

The Contractor designs, supplies, installs, and commissions addressable Fire detection systems required for the weighbridge.

The fire detection system shall consist of control panels connected to field devices such as fire detection devices and monitoring devices located throughout all areas as defined in the buildings. Analogue field devices shall be capable of self-testing.

The Contractor shall verify the findings of the document "Fire Detection Requirements for Medupi Power Station" (document number 200-63065) by means of a fire risk assessment, to be submitted to the Engineer for approval.

The Contractor shall, as a minimum, examine, quantify/qualify, and document the following aspects as part of the fire risk assessment:

(1) The risk incurred by the exclusion of fire detection from the weighbridge.

(2) Motivation for any additional fire detection not scoped in "Fire Detection Requirements for Medupi Power Station" (document number 200-63065), subject to the Engineer's approval.

(3) The verification of the Employer's documentation (200-78980) describing the need for an intrinsically safe design and installation of any BMS equipment, as defined in SANS 10108, for all building/plant areas of the power station.

(4) The classification in terms of category (i.e., L1, P1 etc.) of all fire zones where fire detection is installed, as per SANS 10139.

(5) Verification of the fire zoning according to fire protection and HVAC designs.

(6). The Contractor shall supply and install the fire detection system in all.

building areas as identified in the fire risk assessment document.

(7). The fire detection system shall be designed to mitigate against the risks identified by the Employer and the Contractor's fire risk assessment.

(8). The fire detection system shall be designed for each panel to operate independently from the BMS and CBMS system.

(9). The fire detection systems shall be modular in design and have facilities for

operating as stand-alone units, or as part of a network.

The FDCP shall be completely modular and expandable.

(10). Expanding or adding options shall be by means of plug-in modules that are automatically configured by the FDS.

(11). The design of the FDS shall allow add-ons of field devices to be carried out on site.

(12). The occurrence of a fire or fault alarm shall be recorded and reported without

operator intervention.

(13). The receipt of new alarms shall not be inhibited by existing alarms or operator.

actions.

(14). A fault signal, or a keyboard operation carried out by an operator, shall not inhibit or

delay the receipt of additional alarms.

(15). The FDS shall employ methods to actively limit the number of false alarms generated such as (but not limited to) voting system by devices.

(16). The FDS shall be self-configuring with the ability to automatically detect cable.

connections to all field devices along the loop.

(17). The FDS shall be able to log all changes made to its configuration and the

associated user.

6.4 ACCESS CONTROL SYSTEM

(1) The access control system (ACS) and associated software forms part of the fully integrated system and should be fully compatible with the CBMS. The Contractor is required to design, install, and commission access control systems as defined by the Employer's requirements.
(2) The ACS shall interface closely with the subsystems of the BMS, namely the CCTV system and the Fire Detection System. Typical examples of this interface include ACS and motion triggered video recording and Fire Detection System triggered door releases.
(3) The ACS shall support time periods, scheduling, embedded zoning, and access levels. The Contractor shall submit the zoning philosophy to the Engineer for approval. The Contractor shall coordinate the zoning for access control with zoning philosophies for fire detection, HVAC, and CCTV.
(4) The access control system design for server rooms and data centres shall comply with the recommendations, specifications and requirements set out in Eskom document 32-894 "Eskom Server Room and Data Centre Standard" as found in Appendix A.
(5) Where any conflict arises between the above-mentioned standard and these works, the Contractor shall identify the conflict and recommend a solution to the design Engineer and project manager.

6.5 STANDARDIZATION REQUIREMENTS

1 The Contractor shall standardize similar plant components with the rest of the power plant to ensure simplified operation and maintenance, and reduced lifecycle management costs.

2 The system shall employ a uniform approach across all plant areas as per the rest of the power plant with respect to design philosophy, basic functional characteristics, system interfaces, documentation, standard function blocks and engineering tools.

3 The requirements of standardization shall be applicable to all C&I plant and material including the controllers and servers or computers. The Contractor shall supply a standardization strategy document for the Employer's approval during concept engineering design phase.

6.6 PHYSICAL CHARACTERISTICS OF CONTROL AND MONITORING SYSTEM

6.6.1 Operator Stations

The primary function shall be to monitor and will not be used in protection.

The Operator desk shall consist of two Operator station as a minimum – one for weighbridge operation and the other for CCTV and BMS functions.

6.6.2 Operating Screens

The minimum size of the operating screens is 24".

6.6.3 Operating Workstations

The operating workstation shall have the following characteristics:

- 19" rack mounted workstation
- Uses dedicated workstation hardware.
- Rated for continuous use (24/7)
- Redundant network ports (with redundant connections to the network)
- Hard drives are redundantly configured via a suitable RAID configuration.
- Redundant power supplies
- Remote diagnostics, monitoring & alarming.
- Engineering Stations

Portable engineering station shall be provided. The operator workstation should also have engineering functionalities but only accessible with engineering or admin login details.

6.6.4 Servers

Redundant server(s) to provide the following functionalities will be provided by Contractor:

- Engineering servers – for the storage of the plant area's engineering database. The control system logic is created and modified via the engineering server and then downloaded to the relevant controllers.
- Historian/PIS servers – for the long-term storage of the plant area's information
- Update server – for the centralised management and distribution of antivirus software and security patches updates on all workstations and servers on the network
- Webserver – for view of the Weighbridge operations compliant to Eskom IT and Cyber security Requirements

Each of the above servers can share functionality and do not have to be separate individual servers. Typically, multiple servers (as described above) may be hosted in one redundant set of hardware. However regardless of how many redundant sets of server hardware are used by the Contractor to realise the above server functions, each server machine must have the following physical characteristics:

- Redundant connections to each applicable network
- Redundant power supplies
- Use dedicated server hardware.
- Hot swappable redundant hard drives via a suitable RAID configuration
- 19” Rack mounted in network cabinets

6.6.5 Network Switches

The housing and functionality requirements for all network switches shall be securely mounted in either the network cabinets or control system cubicle. All network switches shall be managed network switches with the following characteristics:

- Monitoring of the port connections and health of the device remotely
- Remote management, configuration
- All network switches support the backup and restoring of all configuration settings.
- Remote network traffic monitoring
- Redundant power input ports
- All network switches are SNMPv3 compatible.
- All network switches are IPv6 compatible.
- Any network switch not housed in a network cabinet is of industrial Ethernet type and suitable for uncontrolled environmental and harsh conditions.

6.6.6 Network Cabinets

All servers and operator workstations will be housed in 19” network cabinets. Redundant servers should be mounted in separate network cabinets. Patch panels and network switches may be mounted in the same network cabinets (as opposed to dedicated network switch cabinets). As far as possible, all connectors on rack-mounted components must be rear facing in the network cabinet for easier cable management. Top entry shall be used for network cables and bottom entry for power cables.

The network cabinets must have the following characteristics:

- Fully perforated front and rear server cabinet doors to maximise air flow.
- Top panel with grommet holes for cable entry
- Removable solid side panels
- Any cable cut-outs beneath the network cabinet must be sealed to prevent air leakage using raised floor grommets.

- There must be no open spaces between the rails and sides of rack enclosure. This ensures the network cabinet air flow is managed correctly.
- Comprehensive internal cable management system (for both horizontal and vertical cable management
- Blanking panels on all unused slots to manage air flow efficiency and reduce hot spot temperature in the network cabinet.
- Redundant Intelligent rack mounted power distribution units for remote management and diagnostics
- Rack mounted environmental monitoring devices for remote monitoring of the network cabinet environment.
- Rack mounted LCD & keyboard
- Flexible brushes or shields must be used to prevent air leakage via cable entries.

Network cabinets must have sufficient depth to allow free air around cables in rear.

7 ELECTRICAL WORKS

The *Contractor* shall design, procure, supply, install and commission all electrical work, cabling, cable terminations, earthing lighting and small power for a complete functional system.

The Contractor shall tie inn on the indicated power distribution board for Access Control Building and Weighbridge system, C&I equipment, lighting etc. The Contractor shall comply with Eskom HAZLOC standard.

7.1 WEIGHBRIDGE SYSTEM

Electrical supply requirements for the weighbridge scale system shall be defined as follows.

1) A main power panel shall be provided as part of the weighbridge control room infrastructure and shall include circuit breakers for the weighbridge system's powered equipment.

2) All required junction boxes, terminal strips, power conditioners, UPS units, and lightening/surge protection devices, shall be provided.

3) All electrical requirements shall comply with Eskom's electrical equipment specifications.

4) Power supply redundancy shall be provided temporarily by means of one or more UPS units capable of meeting the electrical power requirements of full weighing operations for two hours plus system shutdown time.

7.2 SMALL POWER AND LIGHTING – All Buildings

The *Contractor* shall provide and install all small power and lighting for all building(s) in accordance with the small power and lighting drawings Coal Fired Power Stations Lighting and Small Power Installations standard 240-55714363.

1. The following lighting and small power requirements are to be utilised for every building as aminimum. Any building specific requirements will be given under each building section:
   a. Temporary construction lighting and small power shall be provided by the *Contractor*.
   b. The *Contractor* shall design, manufacture, install and commission lighting and small powerfor the buildings that will include:
      i. least one single phase 16A 230V plug outlet per room, the plug outlet will be providedevery 10m on every wall and 1m above the floor.
      ii. Internal lighting designed to integrate with the installation arrangement of the equipment.
      iii. At External/peripheral lighting that illuminate at least the walkway and landings of the building.
      iv. Emergency lighting in the buildings.
   c. All electrical equipment selected for the classified areas must comply with the area classification requirements and applicable standards. The design must cater for minimising the electrical equipment in hazardous zones by locating this equipment in

less hazardous zones.

d. Lux levels survey shall be conducted upon completion of lighting installation to ensure or guarantee that the illuminance meets the requirements of South African National Standards as well as minimum values stipulated by occupational health and safety act.
e. The equipment of the same rating should be fully interchangeable to allow for low inventory and reduced down-times.
f. No cables or wires are allowed to run on the floor surface.
g. The *Contractor* shall submit both manufacturing and construction ITPs for lighting and powerdistribution board for acceptance by the *Project Manager* prior to starting with actual works.
h. Factory acceptance testing/inspection is mandatory for small power and lighting distributionboard as well as light fittings.
i. All lighting and small power designs and installations shall comply with the following standards:

   i. 240-55714363 Eskom generation Lighting and Small Power Installation Standard
   ii. OHS Act: Occupational health and Safety.
   iii. SANS 204: Energy Efficiency in Buildings
   iv. SANS 10142-1: The wiring of premises Part 1: Low-voltage installations

7.3 EARTH MAT AND LIGHTNING PROTECTION -All buildings

(1) The *Contractor* shall be required to install the earth mat for the building(s) and equipment, including connecting all foundations and structural steel, as defined within the Specification as such shall be provided as part of the contractor works.

(2) The *Contractor* shall provide the lightning protection system in accordance with the Employer's drawings and the Earthing and Lightning Protection Standard, 200 11757.

(3) The *Contractor* shall refer to the above standards, these standards include requirements and constraints pertaining execution of the Works. Where applicability of this standards is not clear the *Contractor* shall query such with Engineer before undertaking Works that are the subject of this standard.

(4) The *Contractor* will be responsible to design, installation, and commissioning of the earth mat andlightning protection for the buildings where required.

(5) The *Contractor* shall design earthing and lightning protection systems in accordance with 240- 56356396 Earthing and Lightning Protection Standard and 0.84/3482 Medupi Power Station Earthing Standards.
(6) The *Contractor* shall earth all installed equipment in accordance with 240-56356396 Earthing andLightning Protection Standard.
(7) The *Contractor* shall perform earthing continuity tests as part of the quality control process and provide an earthing certificate for all tested equipment. The tested earthing points must be markedand recorded for reference purposes (plant earthing maintenance purposes). All installation plansmust be submitted to the *Project Manager* for testing witnessing purposes.
(8) The *Contractor* shall ensure that all outdoor electrical equipment is weatherproof with at least anIP 65 rating.

(9) The earthing and lightning protection will be interconnected to the existing power island earth mat.

(10) The *Contractor* is responsible to test the integrity of this mat in the area that was worked and repair it if required.

(11) The *Contractor* shall clearly define the design, philosophy, and implementation (installation) plan with drawings, calculation, software applied and all supporting documentations for:

1. Lightning protection
2. Earthing design

7.4 CABLING AND RACKING

Cabling and racking shall comply to Medupi Power station Cabling and racking standard, 200 11768.

7.4.1 Cabling – all buildings

1. Eskom engineering will allocate a point of power supply from which the *Contractor* will terminate and pull the permanent power supply cable to the distribution board. Cabling shall comply with Eskom specification (240-56227443).
2. The *Contractor* shall determine the cable route from the allocated power point.
3. All electrical equipment selected for the classified areas must comply with the area classification requirements and applicable standards. The design must cater for minimising the electricalequipment in hazardous zones by locating this equipment in less hazardous zones.

7.4.2 Cable servitudes, racking and supports – all buildings.

1. *Contractor* shall comply with the requirements for Control and Power Cables for Power StationsStandard (240-56227443).
2. The *Contractor* shall determine the cable route from the allocated power point.
3. The *Contractor* is to procure and install the correct size power cable to feed the main DBs of eachbuilding from the allocated power source.
4. Equipment foundations or supporting structures shall be designed to allow for cable access to equipment. Servitudes for all cable routes shall be allocated and are to be shown on plant layout drawings. Separate servitudes shall be allocated for control cables and power cables have permissible spacing between control cable routes and power cable routes.

7.5 LV SWITCHGEAR – ALL BUILDINGS

1. The electrical power supply allocation will be done by the *Employer.*
2. The *Contractor* is to supply and install the correct size bucket for the switchgear that will supply thepower to the motors. The *Contractor* is to update all labels on the switchgear where applicable following the KKS standard. The *Employer* shall provide all relevant switchgear documentation once the allocation has been done as per the size of the motors.
3. The *Contractor* shall reseal any fire sealing that had to be damaged by installation of the cables.

7.5.1 Testing and Proof of Compliance – all buildings

1. The relevant certificates and test reports shall be provided by the *Contractor* to prove compliance to the relevant specifications. If the equipment supplied has been typed tested, type test certificatesfor that make will be acceptable and do not have to be re-

tested. E.i electrical CoC

2. The equipment offered shall be identical to the type of equipment tested. In the event that components differ from the once described in the type test certificates/reports, the components shall be subjected to retesting before acceptance by the *Project Manager*.

7.5.2 Factory inspection and testing – all buildings

1. The Project Manager shall inspect the Plant in the manufacturer's premises before dispatch and Contractor shall advice on a period required for the inspection and testing activities. Allowance shall be made in the delivery time to cater for this requirement.
2. The Contractor shall supply a detailed procedure that will be used for Factory Acceptance Tests (FAT's) to be accepted by the Project Manager, 30 calendar days prior to starting date of the first FAT. The *Contractor* shall also give the *Project Manager* at least 14 calendar days' notice of thedate on which the equipment is ready for inspection and testing.
3. If the factory inspection and testing is not to be done with the within the Republic of South Africa,at least 10 weeks' notice is required.
4. The light fittings hat will be used will comply with the testing procedure set out by the small powerand lighting Eskom generation Lighting and Small Power Installation Standard (240-55714363)

7.5.3 Component's acceptance – all buildings

1. All active components of the Plant that do not form part of the OEM's original design shall be subjected to Acceptance by the *Project Manager*. The component shall comply with the relevant requirements of this Specification as a minimum.
2. Where required, the *Contractor* shall provide calculations to prove the component application, design, and compliance to the requirements. The relevant schematic drawings shall be used for theacceptance of components application. Should the requirements not meet the component application design requirement, the additional cost is borne by the *Contractor*.
3. Original copies of the technical documentation of each component shall be provided in a file complete with contents list with all calculations per component. A copy of filed labelled ComponentsAcceptance File shall be submitted in the regard.

7.5.4 Factory Inspection and Clearance for Dispatch – all buildings

1. The *Project Manager* shall be provided with the access to the *Contractor's* requirements on inspections, surveillance, and audits.
2. The *Contractor* shall obtain clearance from the *Project Manager* before despatching of theequipment. This factory release inspection shall not release the *Contractor* of any of his obligationsunder the contract.
3. No plant shall be released for dispatch without the AS MANUFACTURED documentation and drawings accompanying them.

7.5.5 Site testing and commissioning – all buildings

1. The Contractor shall conduct the following tests and checks once the erection of the Plant on sitehas been completed (as a minimum requirement):
    a. Settings adjustment, operational checking of each functional unit.
    b. Checking for any visual damage to the functional units and all other equipment.
    c. Check tightness (torque where applicable) on all connections.

d. Check the fixing and locking devices on doors and covers.

e. Repetition of all electrical functional tests where possible.

f. Lighting lux level tests.

2. The *Project Manager* shall witness the tests and checks.
3. Once the Contractor has satisfactorily completed all his tests, the *Project Manager* shall ensure conformance to the relevant specifications. These checks by no means release the Contractor of his obligations to perform all site inspection, testing and commissioning.
4. Upon completion of commissioning, the *Contractor* shall provide as built drawings within a period of 14 Calendar days.
5. The *Contractor* shall provide supervision during the erection, installation, site testing and commissioning of the Works. The supervision shall also be available during functional checks.
6. Commissioning checks for the complete system will be led by the *Contractor* in conjunction with the *Employer*'s commissioning team.

8 CIVIL & STRUCTURAL WORKS

The Civil & Structural scope of works includes but not limited to concrete works, steel works, brickwork, earthworks, roadworks, storm water drainage as well as any supporting infrastructure for the Mechanical, C&I and electrical scope indicated above for the Weighbridge and Gate 4 Access Control Building.

The *Contractor* shall be responsible for the design and construction of the Works.

8.1 REQUIREMENTS

1. The *Contractor* shall take full professional accountability and liability for all the Works in the scope and shall provide the following for review and acceptance:

    a) Consolidated detailed design report signed by a Professional Civil Engineer which includes:
        I. Two bi-directional weighbridges with a minimum rated capacity of 60 metric tons (60,000 kg), and the scale platform's footprint shall measure 24m x 3m (minimum).
        II. The structural and mechanical detailed design, fabrication, installation, testing and certification of the weighbridges and all accessories.
        III. Survey results, outcomes of Geotechnical investigation, design criteria/parameters, specifications and standards used, loadings, assumptions, calculations results including detailed design calculations, design models, sources of information and any record of other information associated with the completed Works.
    b) Detailed drawings for construction. Drawings shall be submitted in PDF (and CAD) formats.
2. The *Contractor shall* submit as-built data and drawings of the completed works upon handover. As-built drawings shall be submitted in PDF and native CAD formats.
3. Any discrepancy or ambiguity between the Employer's Specifications or requirements shall immediately be brought to the attention of the Project Manager for clarification.

8.2 STRUCTURAL WORKS

The structural works includes reinforced concrete, structural steelwork, and brickwork.

8.2.1 Initial Assessment

The initial assessment for the structural designs shall include the following:

1. Geotechnical investigation to confirm if the location is suitable for foundations and location for the works.
2. The topographical survey of the proposed area(s)
3. Underground surveys in the proposed areas to locate any underground services.
4. Site Inspection

8.2.2 Structural Design Criteria

The *Contractor* shall consider all the below mentioned design criteria for the Works and the Works shall comply with 240-56364545 Structural Design and Engineering Standard and the normative references within:

8.2.2.1.1 Reinforcement

The contractor shall comply with 84CIVL053 - Medupi Power Station Specification for Structural Concrete

1. Steel reinforcing shall comply with Steel bars for concrete reinforcement standard.
2. Welded mesh reinforcement shall comply with Welded steel fabric for reinforcement of concrete.
3. Bending schedule shall be in accordance with bending dimensions and scheduling of steel reinforcement for concrete.
4. Reinforcement chairs and spacing of spacers shall comply with detailing of reinforcement for concrete.
5. All concrete cover shall be 60 mm in contact with soil/sewage/water, 40 mm when exposed or above ground.

8.2.2.2 Concrete

The contractor shall comply with 84CIVL053 - Medupi Power Station Specification for Structural Concrete

8.2.2.3Brickwork

All brick works shall comply to 200-26680, Medupi Power Station Architectural Technical Specifications for Structures and Other Buildings and shall comply with SANS 227 requirements.

1. Brick walls shall be built in two stretcher bonds.
2. Mortar shall be Class II as per SANS 2001-CM1
3. All brick force shall comply with SANS 2001-CM1
4. Selected wall ties shall comply with the requirements of SANS 2001-CM1

8.2.2.4 Structural Steel

The contractor to comply in accordance with the 240-56364545 - Structural Design and Engineering Standard and all relevant and applicable SANS.

1. Allowable deflections for differential structures are governed by the structural use of steel Part standard and the Southern African Steel Construction Handbook - Red Book.
2. Fixing of purlins to roof beams and trusses by means of angle cleats.
3. Washers shall be used for all bolted connections, and the washers shall comply with SANS 170016-2 Part 16 and SANS 1700-16-3 Part 16.
4. Bolts, nuts, and threads shall comply with requirements of SANS 1700.
5. All metal grating, stair treads and fasteners shall be hot dipped galvanized to SANS 121.
6. Hand railing, floors, platforms, and walkways shall be provided with kick plates.
7. Anchor bolts shall not be less than 16mm in diameter and shall be Grade 4.8 or Grade 8.8.

8.2.3 Construction Criteria

The *Contractor shall* construct the Works in accordance with the contractors' design based on the scope of work for, Medupi power station weighbridge and access control building. The Construction works will be accordance to the above and other relevant and applicable SANS regulatory and legislative requirements.

8.2.3.1 Concrete Works

South African Standard Construction Works Part CC1: Concrete works (structural) shall be used for all concrete works. Requirements pertaining to concrete batching, construction and testing are stated in the 84CIVL053 Medupi Power Station Specification for Structural Concrete.

The SANs 2001-CC1 will be read in conjunction with the 84CIVL053 Medupi Power station concrete specification.

The *Contractor* shall:

1. Pay special consideration to the construction of concrete classified as "massive". Some provisions to be considered for the casting of "massive" concrete elements must include the use of fly ash, the cooling down of reinforcement and concrete mixing material (reducing the temperature of the concrete at the time of placing) and protection of the placed concrete.
2. Provide the Engineer with concrete temperature readings indicating that the temperature gradient between the hydrations peak.
3. Submit to the Engineer concrete mix designs, concrete-mix test cube results and all other required test results as indicated in the Medupi Power Station Specification for Structural Concrete (84CIVL053) prior to the placement of any concrete.

Also submit to the Engineer for review, detailed construction method statements and a quality and test plan prior to the casting of concrete. Construction joints and reinforcement shall be indicated as hold points for the approval by the Engineer.

4.
5. Include all specified tests and interventions as a minimum in the inspection and test plans.
6. Consider provisions to minimise early thermal cracking of the concrete.
7. Refer to specialist literature if required.
8. Familiarise himself with the local environmental conditions.

8.2.3.2 Structural Steelwork

1. All work shall be in accordance with the latest edition of SANS 2001-CS1.

2. The *Contractor* shall be responsible for the stability of the entire structure and all structural elements during all the erection stages.
3. All dimensions shall be verified on site by the *Contractor* before any fabrication of steelwork commences.
4. All welding shall be conducted by coded welders. Supporting documentation shall be submitted to the Engineer for acceptance. All welding shall comply with 240-106628253 - Standard for Welding Requirement on Eskom plant.
5. All welding works, testing and inspections shall be performed in accordance with AWS. D1.1 and designers' requirements.
6. The *Contractor shall* supply all bolts, washers, nuts etc. for the structural steelwork.

South African Standard Construction Works Part CS1: Structural Steelwork shall be used for all structural steel works and must be read in conjunction in SANS 2001-CM1.

The *Contractor* shall

1. Refer to the contractors' designer drawings for material grades to be used, fabrication and erection tolerances, testing and corrosion protection of the steel structures and elements. Specific reference shall be made to SANS 10162-1, The Structural Use of Steel- Part 1: Limit-state Design of Hot-rolled Steelwork, AWS D 1.1: Structural Welding Code – Steel, SANS 2001:CS1, Construction Works – Part CS1: Structural Steelwork and other standards listed in the above-mentioned standards.
2. Structural Steel Notes and the Steel Paint Specification given on the contractors' designer drawing shall also to be referred to.
3. Submit, to the employer, steel grade certificates, fabrication drawings, welder's certificates and quality and test plans for review prior to fabrication.
4. Submit a construction method statement for steel works as detailed in the VDSS, inclusive of risk assessments per area of construction, to the Employer for review and approval within 28 days prior to commencement of respective activities for review and approval by the Employer.

8.3 STORMWATER DRAINAGE AND TERRACING

The *Contractor* shall provide adequate storm water drainage for the Weighbridge system and Gate 4 Access Control Building Infrastructure.

The design shall ideally tie into the existing storm water network at Medupi Power Station to reduce the requirements for any additional drainage infrastructure.

8.3.1 Initial Assessment

The initial assessment for the storm water drainage design shall include but not limited to the following:

1. Location of all existing drainage infrastructure within the area contributing to the storm water network and/or independent drainage infrastructure.
2. Topographical survey of surrounding areas to determine contributing catchment areas to the storm water network and the and the Fuel Weighbridge and Gate 4 Access Control Building Infrastructure.
3. Survey of all existing drainage infrastructure.
4. Calculation of pre-development storm water flows, and any other additional process flows which currently contribute to the existing storm water network.
5. Calculation of post-development flows to determine the additional flow that will be entering the existing storm water network.
6. Assessment of the capacity of the storm water network to accommodate the additional flow entering the system.
7. Assessment of any treatment and storage facilities integrated within the storm water network to accommodate the additional flow requirements.

8.3.2 Design Criteria

8.3.2.1 Alternative Studies

Should the existing storm water network be insufficient in accommodating the additional flow, the *Contractor* shall investigate alternative options to cater for the additional flows resulting from the scope.
These may include any combination of providing new drainage infrastructure, upgrading the relevant sections of the existing storm water network, or attenuating this flow prior to its release into a system.
The alternative options considered shall be discussed in the design report. This shall also be supplemented by a high-level cost analysis to support the final design solution to be implemented.

8.3.2.2 Design Considerations

The storm water design shall interface with all existing infrastructure and new designs for the roads and structures. Levels and positioning shall be considered to ensure that no flooding occurs in any existing and new buildings. The natural ground levels shall be assessed and terracing, or localised reshaping may be required to ensure that no ponding occurs in any of the affected areas.

8.3.2.3 Return Period

1. All new drainage structures and/or systems shall be designed for a 1 in 50-year return period.
2. If it is the *Contractor's* intention to connect any new drainage infrastructure into the existing system, then this system shall also be verified to accommodate a 1 in 50-year return period.

8.3.2.4 Flood Calculations

The method used to determine design flood peaks shall be referenced in the design calculations. All design calculations should be submitted in detail in the design report. Outputs from any software used shall be submitted in the appendices of the design report.

8.3.2.5 Rainfall Data

Rainfall data used in the design calculations shall be obtained from an approved source and shall be referenced in the design report.

8.3.2.6 Design of Storm water Pipes

1. A minimum pipe diameter of 450mm shall be used for any new designs.
2. Calculations for the loads on the pipelines and selection of the appropriate pipe class shall be done in accordance with SANS 10102-1 and SANS 10102-2. A minimum of Class 100D is required for all concrete storm water pipes.
3. All storm water pipes shall be designed with a minimum slope of 0.5%. Changes in slope, especially a reduction in slope, shall be avoided as far is possible.
4. Design flow velocities shall be between 0.5m/s and 3.0m/s with a desirable minimum range of between 0.9 and 1.5m/s. The absolute minimum of the half-full velocity shall not be less than 0.6m/s.
5. The design flow in pipes shall not exceed a ratio of 80% of the capacity of the pipe.

8.3.2.7 Manholes

Manholes shall be positioned at distances not greater than 50m apart and at a minimum shall be located at the following points:

1. Where two or more storm drains converge.

2. Where pipe sizes change.
3. Where a change in horizontal alignment occurs.
4. Where a change in grade occurs.

8.3.2.8Design of Storm water Channels

240-57127955 - Standard for Design of Drainage and Sewerage Infrastructure

It shall be *Contractor's* responsibility to ensure that channels shall be designed with a desirable velocity to ensure that no deposition of sediment or erosion occurs for channels which have soil or grass cover. The *Contractor* may introduce direct protection (linings) or indirect protection (obstructions) to reduce flow velocities or erosive capacity of channels. The choice of lining shall be based on its ability to accommodate the design velocity.
For concrete lined channels, design of the concrete section and joints shall take into consideration the expected design velocity and prevention of any concrete pieces breaking away due to pulsating pressure changes at joints.

8.3.2.9 Erosion Protection

It shall be the contractor's responsibility to put in place appropriate erosion protection measures for, amongst others and where applicable, the dissipation of energy in channels, the discharge from pipes or weirs shall be considered where downstream erosion or scouring is possible.

8.3.2.10 Legislation

The following legislative documents shall be adhered to during the designs of all water related infrastructure:

1. The National Water Act (Act No. 36 of 1998)
2. The Environmental Conservation Act (Act No 73 of 1989)
3. Government Notice 704, National Water Act 1998
4. Relevant and applicable regulatory and legislative requirement

8.4 EARTHWORKS AND ROADWORKS

The *Contractor* shall provide an access road to the Weighbridge and Gate 4 Access Control Building Infrastructure. The design should tie into the existing road network at Medupi Power Station. The Works includes but not limited to material filling, layer works, concrete block paving, guardrails, and road markings.

8.4.1 Initial Assessment

The initial assessment for the Road designs includes but not limited to the following:

1. Geotechnical investigation of the ground to confirm if the location is suitable for roadworks.
2. Site investigation.
3. The topographical survey of the proposed area(s).
4. Underground surveys in the proposed areas to locate any underground services.
5. Location of existing road(s) infrastructures within the area to tie in the proposed access.
6. Survey of all existing road infrastructures.

8.4.2 Earthworks and Road Design Criteria

The *Contractor* shall consider all the below mentioned design criteria for the Works and the Works shall comply 240-84418186 - Road Specification Manual and Standardized specification for civil engineering construction Section M and the normative references within:

8.4.2.1 Layer ways and Concrete Block Paving

1. Precast concrete kerns, edgings and channels shall comply with SANS 927.
2. Road lime chemical stabilizing agents shall comply with SANS 824.
3. Chemical stabilizing cement shall comply with SANS 50197-1.
4. Concrete paving blocks shall comply with the requirements of SANS 1058.
5. Guardrails shall comply with the requirements of SANS 1350.
6. Guardrails shall be galvanized with a hot-dip (galvanized) zinc coating.
7. Timber posts shall comply with the requirements of SANS 457.
8. Posts shall have a top diameter of not less than 150 mm. Posts with a top diameter up to 230 mm will be acceptable, provided that posts with widely varying diameters shall not be used together in the same length of guardrail typical lap length is required to be 45 × smaller bar diameter.
9. Timber posts and spacer blocks shall be treated in accordance with SANS 10005 using creosote that complies with SANS 538 or SANS 539

8.4.2.2Guardrails

1. Guardrails shall comply with the requirements of SANS 1350.
2. Guardrails shall be galvanized with a hot-dip (galvanized) zinc coating.
3. Timber posts shall comply with the requirements of SANS 457.
4. Posts shall have a top diameter of not less than 150 mm. Posts with a top diameter up to 230 mm will be acceptable, provided that posts with widely varying diameters shall not be used together in the same length of guardrail typical lap length is required to be 45 × smaller bar diameter.
5. Timber posts and spacer blocks shall be treated in accordance with SANS 10005 using creosote that complies with SANS 538 or SANS 539.
6. The retro-reflective material for the reflector plates shall comply with SANS 1519.

8.4.2.3Road Markings

Road marking paint shall comply with the requirements of SANS 731-1 and CKS 192.and Eskom 240-84418186 - Road Specification Manual
The no pick-up time of road marking paint shall comply with Class 1 requirement in SANS731-1.

8.4.2.4Construction Criteria

The *Contractor* shall construct the Works in accordance with the contractors' design based on the scope of works and the SANS 1200 Standards and other relevant SANS specifications referenced herein.

8.5 GEOTECHNICAL WORKS

The *Contractor* shall carry out a geotechnical investigation on the proposed areas. In situ DCP testing shall be carried out to determine soil density. Samples shall be taken for laboratory testing. The following tests shall be carried out as a minimum:

1. Field work.
2. desktop study.

3. Assessment of available construction materials.
4. Laboratory testing & reporting.
5. Foundation Indicator Tests
6. CBR
7. Road Indicator Tests

The *Contractor* shall conduct the necessary tests to confirm the allowable bearing capacity for the associated structures.

8.5.1 Fill Placement

All fills shall be prepared in accordance with the Eskom backfill specification revision 11 and relevant construction drawings. Where the drawings differ from the above specification, the specification shall take precedence.

The *Contractor* shall submit a construction method statement for preparation of engineered fill, inclusive of risk assessments per area of construction, to the Engineer for review and approval within 28 days prior to the commencement of back filling activities for review and approval by the Engineer.

The *Contractor* shall include the following activities and interventions as a minimum on inspection and test plans:

1. Approval of testing equipment including verification of manufacturing specifications and calibration certificates – hold point for *Contractor* and Engineer
2. Approval of construction materials. The *Contractor* shall submit following test results at appropriate intervals to Engineer for review and acceptance – grading, Atterberg Limits, Mod AASHTO and CBR – hold point for *Contractor* and Engineer
3. Rip (if applicable), adjust moisture content and compact subgrade to in situ density specified by relevant drawings and specifications – hold point for *Contractor* and witness point for Engineer.
4. Verify subgrade compaction density and stiffness through specified testing – hold point for *Contractor* and Engineer.
5. Import construction material from approved source – hold point for *Contractor* and Engineer.
6. Compact in approved layer thicknesses to specified in situ compaction densities - hold point for *Contractor* and Engineer.
7. Verify layer compaction density and stiffness through specified testing – hold point for *Contractor* and Engineer.
8. Conduct plate load tests on final layer as per Eskom specification latest revision – hold point for *Contractor and* Engineer.
9. As-built survey of final layer – hold point for *Contractor* and Engineer.

8.6 PAINTING AND CORROSION PROTECTION

The corrosion requirements are stipulated in the Medupi Power Station Corrosion Protection Specification, SSZ_45-17. The painting requirements are stipulated in the Specification for the Identification of the Contents of Pipelines and Vessels,

8.7 CONSTRUCTION MONITORING

The Contractor is responsible for developing the Construction Method Statement and the execution of construction work on site. Quality assurance and control shall apply during the execution phase of the project to ensure that construction is in accordance with the design. The contractor's designer shall comply with construction regulations i.t.o construction monitoring and supervision.

8.8 SITE CONSTRAINTS

a) Weather conditions
b) Existing infrastructure
c) Logistics and supply constraints
d) Site access constraints
e) Underground and above ground services
f) NKP requirements

9 VERIFICATION

9.1 DESIGN REVIEWS

Design reviews shall be conducted in accordance with Eskom Design Review Procedure.

9.2 FACTORY AND SITE ACCEPTANCE TESTING REQUIREMENTS

All factory and site acceptance tests shall be conducted as per the requirements in the scope of work to be developed for execution phase.

9.3 COMMISSIONING AND HAND-OVER REQUIREMENTS

The Medupi Weighbridge and Gate 4 Access Control Building shall be commissioned in line with Medupi Commissioning Procedure and handed over as fully functional system that conforms to applicable standards. The handover documentation shall be in line with Documentation Handover List as agreed between the *Employer* and *Contractor.*

10 MAINTENANCE

The design shall include the following for the plant maintenance requirements:

1 Plant maintainability characteristics sufficient to achieve the required availability.
2 Number and skill of maintenance personnel.
3 Packaging, handling, storage, and transportation.
4 Preferred access routes.
5 Preferred equipment for ease of maintenance.
6 Period between major shutdowns.
7 Standardisation requirements.
8 Maintenance information management.
9 Spares.
10 Special tools & software.
11 Training.
12 Technical documentation:
    a. Manuals.
    b. Procedures; and
    c. Parts catalogue.
13 Pumping system to be designed with sufficient space for easy maintenance (lifting equipment)

11 SPARE PARTS

The supply of all spare parts and consumables required for commissioning, performance and reliability testing of the complete plant up to the issuing of the *Completion* Certificate for the *Works*, shall be the responsibility of the *Contractor.* It is the *Contractor 's* responsibility to ensure that an adequate supply of spares is available on site to fulfil his contractual obligations during the commissioning, performance and reliability testing up to take-over of the plant.
The quantities of spares for two years operation based on the *Contractor's* recommended list shall be ordered at the discretion of the *Project Manager.*

12 PROGRAMMING CONSTRAINTS

The *Contractor* shall

1. be responsible for the compilation of a high-level programme (which includes key dates, milestone dates, etc.) for the *Works*, and shall submit to the *Project Manager* for acceptance.
2. Revise the programme every month to track the progress of the *Works*.

13 AUTHORISATION

The document has been seen and accepted by:

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14 DEVELOPMENT TEAM

The following people were involved in the development of this document:

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15 REVISIONS

Date	**Rev.**	**Compiler**	**Remarks**
November 2017	0	TP Sathekge	Draft version for review by Engineering Team
July 2018	1	TP Sathekge	Final Document
December 2023	2	B Mampa	Revision scope, additional Scope on CBMS and IT & Comms Reviews by Generation Engineering Team Transfer of the scope form Group capital to Generation New template transfer & New document number

16 ACKNOWLDEGEMENTS

This document is a revision on the contents of the 348-908464 Technical Specification for Medupi Power Station Weighbridge and Gate 4 Access Control Building document. Rev 1

The author of this document is acknowledged:

- Tshepo Sathekge

APPENDIX A: MASTER DOCUMENT LIST (MDL)

Table Employer Drawing List

Eskom Number	Sheet	Rev	Building / Area	Description	Discipline
0.84/ 929	4	2	Gate 4: Weigh bridge	Plan, Section, Elevations, Schedules	Arch
0.84/ 929	5	1	Gate 4: Access control	Gate 4 Access Control Building (VOID)	Arch
0.84/ 933	1	0	Gate 4: Access control	Site plan	Arch
0.84/ 933	2	0	Gate 4: Access control	Floor plan and Ceiling plan	Arch
0.84/933	3	0	Gate 4: Access control	Sections	Arch
0.84/933	4	0	Gate 4: Access control	Elevations	Arch
0.84/933	5	0	Gate 4: Access control	Details	Arch
0.84/933	6	0	Gate 4: Access control	Schedules	Arch
0.84/933	7	0	Gate 4: Access control	Drainage	Arch
0.84/50891	1	0	Gate 4: Weigh bridge	Ground Floor HVAC Layout & Sections	Mech
0.84/50892	1	0	Gate 4: Access control	HVAC Plan Layout	Mech
0.84/50892	2	0	Gate 4: Access control	MCC: HVAC Electrical Single Line	Mech
0.84/50886	1	1	Gate 4: Weigh Bridge & Access Control	Weigh Bridge and Access Gate 4 General Sewer Layout	Cid
0.84/50886	2	1	Gate 4: Weigh Bridge & Access Control	Weigh Bridge and Access Gate 4 Sewer Long Section	Civ
0.84/50886	3	1	Gate 4: Weigh Bridge & Access Control	Weigh Bridge potable water layout	Civ
0.84/50886	5	1	Gate 4: Weigh Bridge & Access Control	Access Gate 4 & Weigh bridge sleeves layout drawing	Civ
0.84/50886	6	1	Gate 4: Weigh Bridge & Access Control	Weighbridge clean Storm water layout	Civ
0.84/7243	23	0	Generic Detail	Typical Storm water details, headwall details	Civ
0.84/7258	44	2	Generic Detail	Typical Water Details 2	Civ
0.84/7258	43	3	Generic Detail	Typical Water Details 1	Civ

0.84/27289	6	0	Generic Detail	Typical Valve Chamber type 4	Civ
0.84/7258	28	5	Generic Detail	Potable water fitting list	Civ
0.84/7242	2	11	Generic Detail	Typical thrust block details	Civ
0.84/7244	4	3	Generic Detail	Typical details 3 of 3	Civ
0.84/7244	3	3	Generic Detail	Typical details 2 of 3	Civ
0.84/7244	2	4	Generic Detail	Typical details 1 of 3	Civ

Applicable Drawings

Eskom Number	Sheet	Rev	Building / Area	Description	Discipline
0.84-54230	1	0	Gate 4: Weigh Bridge & Access Control	Medupi Power Station Gate 4 Access Road Plan, Profile and Cross Section	Civ
0.84-54230	2	0	Gate 4: Weigh Bridge & Access Control	Medupi Power Station Gate 4 Access Road Intersection Details	Civ
0.84-54230	3	0	Gate 4: Weigh Bridge & Access Control	Medupi Power Station Gate 4 Access Road Stormwater Culvert Concrete Layout	Civ
0.84-54230	4	0	Gate 4: Weigh Bridge & Access Control	Medupi Power Station Gate 4 Access Road Locality Plan	Civ
0.84/51408	1	1	Gate 4: Weigh Bridge & Access Control	Layout and Long Section	Civ
0.84/51408	2	1	Gate 4: Weigh Bridge & Access Control	Setting Out Plan	Civ
0.84/51408	3	1	Gate 4: Weigh Bridge & Access Control	Road Marking and Signage	Civ
0.84/51409	1	1	Gate 4: Weigh Bridge & Access Control	Cross Sections	Civ
0.84/51410	1	1	Gate 4: Weigh Bridge & Access Control	Typical Cross Section	Civ
0.84/51410	2	1	Gate 4: Weigh Bridge & Access Control	Guardrail and Mounting details	Civ
0.84/51410	3	0	Gate 4: Weigh Bridge & Access Control	Concrete Channels and Outlet details	Civ

0.84/53847	1	0	Gate 4: Weigh bridge	Floor Plan Access Control and CCTV Layout	BMS
0.84/53848	1	0	Gate 4: Access control	Floor Plan Access Control and CCTV Layout	BMS
0.84/53848	2	0	Gate 4: Access control	General door detail	BMS
0.84/50895	1	0	Gate 4: Weigh bridge	Lighting Layout	Elec
0.84/50895	2	0	Gate 4: Weigh bridge	Small Power and Lightning Protection	Elec
0.84/50895	3	0	Gate 4: Weigh bridge	Schematic Diagram DB-GH4	Elec
0.84/50894	1	0	Gate 4: Access control	Lighting, Small Power and Lightning Protection	Elec
0.84/50894	1	0	Gate 4: Access control	Schematic Diagram DB-WB	Elec
0.84/53813	1	0	Gate 4: Weigh Bridge & Access Control	Landscape plan	Landsc
0.84/53813	1	0	Gate 4: Weigh Bridge & Access	Irrigation plan	Landsc

Design Reports

Eskom Number	**Rev**	**Consultant no**	**Title**		**Discipline**
200-81502	2	14133-DC-AE1	Design Calculation File:	Weigh Bridge	Struct
348-80398	0	14133-DC-AE3	Design Calculation File:	Gate 4 Access Control Building	Struct
348-80380	0	803-AE-Calc	Design Calculation File:	Lighting and Small Power Weigh Bridge	Elec
348-80381	0	803-WGB-Calc	Design Calculation File:	Lighting and Small Power Gate House 4	Elec
348-74844	0	SP-0152	Baseline Report	HVAC for Gate 4 Access Control	Mech
348-74843	0	SP-0151	Baseline Report	HVAC for Weigh Bridge Control Room	Mech

Eskom Standards

DOCUMENT NUMBER	TITLE
200-11757	Earthing and Lightning Protection
200-11768	Station Cabling and Racking Standard
200-71827 EED_GTD_C&I_ 006	Alarm Management System Guideline
GGS 0456	Specification for LV Switchgear and Control Gear Assemblies and Associated Equipment for Voltages up to and including 1000 V AC and 1500 V DC
ESKSCAAC6	Specification for the Identification of the contents of Pipelines and Vessels
200-24289 (SSZ-45-17)	Specification for corrosion protection for mechanical items of plant
36-945	Work Instruction for Process (P&ID, PFD, PPFD and SPFD), Hydraulic and Pneumatic Dwgs
36-776	Environmental conditions for Process Control Electronic Equipment used at Power Stations (GGS 1426 rev 0)
PPZ 200-16714	Commissioning & Completion of Medupi Power Station
200-4190	The Application of KKS Plant Coding (NMP 45-7)
200-3340	KKS Coding and Labelling (KKS01)
200-18202	KKS Key part – Fossil Power Station (NPSZ 45-45)
200-5343	Medupi Power Station Project – Standard Abbreviations (KKS02)
200-94660	Issuing of KKS Certificate
36-817	ESKOM UPS Standard
240-55714363	Coal Fired Power Stations Lighting and Small Power Installations
240-56737448	Fire Detection and Life Safety Design Standard
240-54937450	Fire Protection & Life Safety Design Standard
PPZ 200-64539	Documentation Format and Layout Specification
200-5664	Medupi Engineering Change Management Procedure
240-54179170	Technical Documentation Classification and Designation Standard
200-26680	Architectural Technical Specifications for Structures and other Buildings
084CIVL053	Specification for structural Concrete
240-56355466	Alarm management system standard
240-56355729	Plant Control Modes Guideline
240-56355754	Field Instrument Installation Standard
240-56355815	Junction Boxes and Cable Termination Standard
240-56355843	Pressure Measurement Systems Installation Standard
240-56355888	Temperature Measurement Systems Installation Standard
240-55410927	Cyber Security Standard for Operational Technology
240-56355731	Environmental Conditions for Process Control Equipment Used at Power Stations Standard
240-56355808	Ergonomic Design of Power Station Control Suites Guideline
240-56355728	Human Machine Interface Design Requirements Standard

Site Layout