




Medupi Power Station – Civil Specification (Low pressure services)

	ENTERPRISES DIVISION PROJECT MEDUPI	DOCUMENT No: 84CIVL052	REVISION No: A
	DOCUMENT TYPE: DESIGN SPECIFICATION	CONTRACT PACKAGE: P 04	DATE: 13/02/2008
TITLE: Civil specification – Low pressure services (Civil Design and Building Works)		COMPILED BY: Tsepo Matekane  Civil Engineering	
DISTRIBUTION LIST:	ACTION TO BE TAKEN:	APPROVED BY: Galia Dudenska.  20/02/2008	
		AUTHORISED BY:	
REVISION: A	DESCRIPTION OF REVISIONS:		
COMMENTS:		REFERENCES:	
LAST REVISION DATE: 13/02/2008			

**Civil Specification for low pressure services – Pump House, Turbine
lubrication oil storage, diesel oil storage and Distribution system
Civil Design and Building Works**

Contents

1	GENERAL.....	3
2	GEOTECHNICAL INVESTIGATIONS	4
3	SCOPE OF WORK	4
	3.1 BUND WALLS	5
	3.2 DRAINAGE	5
	3.3 ROAD AND PARKING AREA.....	5
	3.4 TRENCHES.....	6
	3.5 PLINTHS.....	6
	3.6 PIPE SUPPORTS.....	6
4	BEFORE COMMENCING DESIGN	7
	4.1 DESIGN PHASE.....	8
	4.2 BEFORE APPLICATION FOR LICENCES OR PERMITS, FABRICATION OR CONSTRUCTION.....	9
	4.3 CONSTRUCTION PHASE.....	10
5	CIVIL DESIGN REQUIREMENTS.....	11
	5.1 CONSTRUCTION SPECS.....	12
	5.2 EMBEDDED PARTS.....	13
6	CO-OPERATION WITH OTHERS.....	13
7	CIVIL LIAISON ENGINEER.....	13

1 GENERAL

This specification describes the following:

- The detail civil design of the foundations and structures for the low pressure services including turbine lubrication oil storage, regeneration diesel oil storage, distribution system, plinths for pumps and motors, dewatering trenches in the Station Service Building and supporting structures for all equipments. All shall be deemed to be within the scope of the Contractor.
- The manufacture, testing and supply of structural components and materials for construction of the foundations and structures for the low pressure services pump houses, lubrication and diesel oil storage, and distribution systems shall be deemed to be within the scope of the Contractor.
- The construction of foundations and structures for the low pressure services pump houses, oil storage facilities, distribution systems and supporting structures for all equipments, shall be deemed to be within the scope of the Contractor.
- Corrosion protection and finishing of the plants and equipments shall be in accordance with the document No. 84CIVL007.
- All necessary interface requirements shall be provided by the Contractor.

Details and drawings of any civil works which are not explicitly included in this Contract but which, in the opinion of the Contractor, shall be necessary for the completion and proper execution, safe and efficient operation and maintenance of the project, shall be included by the Contractor. The Contractor shall indicate clearly his proposed scope of works regarding these additional elements. Likewise the Contractor shall also clearly indicate elements, described in this specification, which in his opinion will be necessary or require variations to suit his proposed operations.

Notwithstanding the requirements of this specification, a detailed listing of all interface requirements will be agreed and signed-off between the Contractor and the Engineer at the final pre-contract meeting. Further additional meetings will be held as necessary to ensure the smooth flow of information between the Contractor and the Engineer. The Contractor shall make the relevant experts available when required.

2. GEOTECHNICAL INVESTIGATIONS

Report on geotechnical investigations for Project Medupi was completed by Partridge Maud and Associates in January 2007. Additional geotechnical investigations have been conducted in March'2007.

The Contractor shall make his own assessment of the currently available information and make whatever additional site investigations (including drillings and testing) he considers necessary to assist in the design of his works. The Contractor will identify and specify any additional works.

The Contractor shall accept responsibility for all ground conditions.

3. SCOPE OF WORKS

All information including layouts, calculations, detail drawings, specifications and bill of quantities, required for the timely planning, design and construction of the civil works shall be provided by the Contractor.

The Contractor shall ensure that all structures, tanks, equipment, cable trenches and service routes which are incorporated into this contract are functionally and efficiently located and that each component is sized for optimum space usage and efficient operation.

The Contractor shall submit in a timely manner his design calculations and drawings of the civil items which are within his scope of work for comments and approval by the Engineer.

The Contractor shall build fully operational Storage Plant in accordance with this specification.

The Storage plant, plinths, trenches, pipe supports, road and parking lot, use common materials that are generally available and present with no special maintenance or handling problems. Storage plant foundation structures, drainage facilities, parking lot, road and the fence shall be constructed according to the given information. The soil at the site shall be levelled and prepared to a finished ground level by Contractor.

3.1 Bund Walls

The bund Walls shall be constructed of light non-combustible materials on a plinth footing/foundation.

- The Fuel tanks shall be supported by plinths (concrete structures). and all work shall comply with the National building regulations SANS 10400-1990-2, SANS 1200 and the local Authority Regulations
- Pump shelter shall be provided with adequate roofing.
- Floors, walls and shelter roof shall be designed and installed to limit the generation and accumulation of static electricity and have fire resistance of at least two hours. For details of floor, roof and walls, please refer to document No. 84CIVL007.

3.2 Drainage

- The designed drainage system will need to meet the discharge quality and quantity requirements specified by the institution responsible for receiving the storm water (i.e. Department of Water Affairs and Forestry) and the Record of Decision (ROD) for the Low pressure Turbine lubrication oil, diesel storage and dirty oil collecting and distribution system.

3.3 Road and parking area

The road and parking area shall conform to the following requirement.

- The layer works for roads and parking area shall be designed to acceptable designed standard. For details please refer to document no. 84CIVL018.doc.
- A road shall be constructed to connect original Road to fuel tank storage plant and the receivers for the offloading truck parking and vehicle parking
- The road width shall be sufficiently large enough for 3.5m by 10m offloading truck.
- Interlocking paving blocks shall be used as wearing surface.
- Parking areas shall be constructed in front of the receivers for 3.5m by 10m offloading truck.

3.4 Trenches

- Trenches which are incorporated into this contract must be functionally and efficiently located and must be sized for optimum space usage and efficient operation.

3.5 Plinths

- All pumps and motors must be supported and adequately anchored onto concrete plinths. Plinths must be sized for optimum space usage and work shall comply with the National building regulations SANS 10400-1990-2, SANS 1200 and the local Authority Regulations

3.6 Pipe supports

- Pipes must be routed along walls supported by clamps, bolts and screws; which shall be steel, stainless steel or phosphor bronze. Steel bolts, washers and screws are plated and passivated.

For all other architectural details please refer to the document no. 84CIVL007 which is the Conceptual Architectural Design specifications for structures and other buildings.

4 Before Commencing the Design

Before commencing the design of the civil and structural works, the Contractor shall produce a design document for approval by the Engineer titled ‘Design Criteria of Civil and Structural Work’ which shall summarise the design criteria that will be used and shall include, but not limited to:

- Scope,
- Units,
- Codes and standards,
- Loads, forces, safety factors and combinations,
- Materials to be used,
- Allowable bearing capacities and characteristic strength of the materials,
- Design methods,
- Computer programmes,
- Conceptual layout,
- Effluent inflow and outflow capacities,
- Potable water requirements during and after the construction,
- Programme (time scales), with delivery dates for the submission of drawings and calculations.

Details shall be given of the computer programs used and any certification of approval by independent authorities shall be given for the programs used. Use of such programs shall be to the approval of the Engineer.

4.1 Design Phase

The Contractor shall be responsible for the detail design of the plants and shall be responsible for ensuring that the design satisfies the structural, dynamic, seismic, acoustic, hydraulic, esthetical, safety and environmental requirements of all permits and statutory obligations.

Buildings, structures, foundations, equipment foundations, supporting structures and ancillary structures will be designed for the worst combination of dead loads, construction live loads, plant loads, seismic, impact and dynamic effects due to operation of plant, crane loads, maintenance loads, earth pressure, wind loads and temperature effects.

All structures have to be designed for seismic forces with peak ground acceleration of 0.05 g according to recommendations for seismic design of Medupi, document No. 84CIVL028A.

All Plants, materials and equipments shall be designed for operation with minimum requirements for maintenance and operation.

Medupi Power Station – Civil Specification (Low pressure services)

Service provided by the Contractor in the design phase include, but shall not be limited to:

- Complete process design in accordance with the requirements in this specification.
- Sizing and optimising of the different components and the system.
- Design of the foundations and the structures of the all components of the plant.
- Design of the foundations and supporting structures for equipment of the plant.
- Design of all services required for the complete process (water, electricity, telecommunications).
- Architectural design.
- Security of the plant.
- Fire fighting system.

All calculations relating to civil, structural and building work shall be submitted for approval by the Engineer in English. Calculations shall be arranged in a logical sequence and shall include such sketches and annotations as may be required to make themselves explanatory.

Calculations shall clearly identify the subject of the calculations and shall include, but not be limited to the following information:

- Contractor's name,
- Project name,
- Designer's name,
- Checker's name,
- Contract No.,
- Date of calculation,
- Revision No.,
- Name of the item,
- Page No.,
- Assumptions used for design purposes,
- Codes and standards used,
- Computer programmes used,
- Loading imposed by structures, plant and equipment during erection, commissioning, operation and maintenance,
- Safety factors and combinations of loads used,
- Calculations of all components of the structures,
- Calculations of all buildings and structures foundations,
- Settlement of plant and equipment foundations,
- Design of the floors for track loads,
- Reference sources (including text books and design manuals used),
- Reference to the appropriate drawing,
- Manufacturer's technical specification.

All calculations and computer print-outs shall be on A4 size paper and should be bounded.

All calculations shall also be submitted in electronic format.

Drawings prepared by the Contractor shall include complete construction details including, but not limited to:

- General arrangement layouts,
- Layouts of the different components of the plant,
- Sections and elevations,
- Architectural drawings,
- Reinforcements drawings and schedules,
- Construction joint details,
- Details of embedded parts,
- Structural steel detailing,
- Details of all plinths, openings, box-outs, holding down arrangements, grouting etc. required for the plants and the equipments,
- Details of trenches and manholes,
- Details of services (pipes, cables) routes and any particular requirements for back filling,
- Details of any lifting equipment and requirements,
- Details of windows and doors sized to allow track deliveries,
- Details of ventilation system,
- Details of fire fighting equipments,
- Cladding and roofing details,
- Corrosion protection of all steel parts,
- Acid resistant floors,
- Floor drainage system and sump for accidental spillage of chemicals.

All drawings shall be designed, checked, reviewed and signed by the Contractor before submission.

Drawings shall also be submitted in Microstation CAD format.

Submission of designs and drawings should be at regular intervals, to ensure a steady flow of submissions.

4.2 Before Application for Licences or Permits, Fabrications or Construction

Three copies of all design calculations and three copies of all drawings must be submitted for approval to the Engineer, before the relevant application, fabrication or construction work is carried out. The Contractor's programme shall allow at least two weeks for the Engineer's approval and at least one revision following the Engineer's initial comments.

After the revision, three copies of all drawings shall be stamped "Approved for construction" and shall be submitted to the Engineer prior to commencement of fabrication or construction.

After the approval, all changes shall be clearly designated on the drawings with the revision letter shown in an adjacent triangle.

Approval of the Contractor's drawings or calculations by the Engineer shall not relieve the Contractor of any of his obligations to meet all the requirements of the Contract or relieve the Contractor of his responsibility for the adequacy of design calculations and drawings.

The Contractor shall prepare all applications in the required format and supported by appropriate documentation for all permits and authorisations required for the project to proceed to the implementation phase.

The Contractor shall prepare bill of quantities and project specifications for the construction phase.

A detailed Construction Work Programme, broken down to specific tasks and time allocated for completion of each task must be submitted.

4.3 Construction Phase

The building works to be provided by the Contractor include, but shall not be limited to:

- Supply of all materials for the construction of fully operational Fuel storage Plant.
- Excavations and casting of all foundations for the buildings supporting structures and for the equipments.
- The Contractor shall supply and install all reinforcing bars required for the concrete elements,
- Construction of the buildings, structures, tanks and different components of the plants.
- Testing of the welding works (steel structure and pipes).
- Excavations and backfilling of cable trenches and building of cable manholes (including cables and trays).
- Excavation and backfilling for pipelines and building of manholes (including laying of pipes, fire hydrants, valves).
- Provision of all scaffolding, site craneage, lifting and jacking equipment, etc. which shall be required by the Contractor for all works in his scope of supply.
- Provision of all embedded anchor bolts, sleeves, anchors and other miscellaneous embedded parts required for the installation of all plant items and structural steel work items within this Contract, including setting templates required for the placement of anchor bolts/embedment.
- Provision and installation of plant equipment.
- Grouting in of all plant, equipment and structural steelwork.
- Random concrete cube tests.
- Curing of the concrete.
- Provision and installation of steel walkways, ladders, staircases, platforms and handrails.
- Provision and installation of cable trays, cable supports, cables and electrical equipments.
- Provision and installation of pipes and their supports (above ground level).

- Fire fighting system.
- Heating, ventilation and air-conditioning of the buildings.
- Corrosion protection of all steel parts.
- Site landscaping and finishes of the compound.
- Operational testing of the Works.
- Operation and maintenance specifications of the plant.

The Contractor shall be responsible for levelling and adjusting plant/steelwork within its scope of supply in the correct position preparatory to grouting. The Contractor shall take all measures necessary to ensure that the plant remains in the correct position until the completion of grouting (including curing of the grout).

5 CIVIL DESIGN REQUIREMENTS

5.1 Foundations and Structures

The Contractor shall engage a competent Qualified Person (Professional Engineer) experienced in the design of low pressure Turbine fuel storage plant to be fully responsible for the design and supervision of the construction civil works within the Contractor's scope of works.

The Contractor shall liaise with the Engineer at all stages during the selection of the enclosures and shall submit for approval the selected materials, finishes and standards used for design, erection and installation of buildings, structures and equipment.

Non-combustible or fire-resistant components shall be used in the construction.

The Contractor shall comply with codes for buildings and structures wholly within his scope of works including but not limited to the following:

SANS 10021	2002	The water-proofing of buildings (including damp-proofing and vapour barrier installation
SANS 10100-1	2000	The structural use of concrete Part 1: Design
SANS 10100-2	1992	The structural use of concrete Part 2: Materials and the execution of work
SANS 10109-1	1995	Concrete floors Part 1: Bases to concrete floors
SANS 10109-2	2004	Concrete floors Part 2: Finishes to concrete floors
SANS 10143	1980	Building drawing practice
SANS 10144	1995	Detailing of steel reinforcement for concrete
SANS 10145	2000	Concrete masonry construction
SANS 10155	1980	Accuracy in buildings
SANS 10160	1989	The general procedure and loadings to be adopted in the design of buildings
SANS 10161	1980	The design of foundations for buildings
SANS 10162-1	2005	The structural use of steel Part 1: Limit states design of hot-rolled steelwork

SANS 10162-2	1993	The structural use of steel Part 2: Limit states design of cold-formed steelwork
SANS 10162-4	1997	The structural use of steel Part 4: The design of cold-formed stainless steel structural members
SANS 10164-1	1980	The structural use of masonry Part 1: Unreinforced masonry walling
SANS 10164-2	2003	The structural use of masonry Part 2: Structural design and requirements for reinforced and prestressed masonry

5.2 CONSTRUCTION SPECIFICATIONS

All civil engineering construction work shall comply with the requirements of SANS 10120 – Series of Specification for civil Engineering Construction and Contract Documents.

All building work shall comply with the requirements of the Model Preambles for Trades (1997) as issued by the Association of South African Quantity Surveyors.

For surface treatments of steelwork provided under this contract see Eskom Specification “Corrosion Protection Specification”, March 2006.

5.3 EMBEDDED PARTS

The Employer will carry out a check on the setting out of all embedded parts within this scope of supply prior to concreting of the relevant structures. Concreting works shall not proceed until this check has been carried out.

6 CO-OPERATION WITH OTHERS

The Contractor’s attention is drawn to the necessary presence of other contractor(s) working on the site prior to and simultaneously with this Contract. Close co-operation and careful scheduling and planning on a continuous basis will be required to minimise interferences and to ensure that safety and good working practices are maintained at all times, in conjunction with adherence to the requirements of the project program.

In addition, the Contractor will be required to work continuously with the Engineer and other contractors in identifying, assessing, monitoring and managing interface issues. This will entail, as a minimum, programming and reprogramming at a detailed micro level of all interface issues in design and construction phases. This will also include agreement on access to, possession and repossession of any specific construction area within the site. Where change is required to items previously agreed, such changes will only be implemented with the agreement of all parties affected.

7 CIVIL LIAISON ENGINEER

The Contractor shall provide a Civil Liaison Engineer for the period of the civil design and construction period. The Liaison Engineer shall be experienced in all aspects of the project, shall have demonstrated experience in a similar role on other similar projects and shall be responsible for the provision on a day-to-day basis of all specific and accurate information needed to enable the timely design and construction of the civil works.