



BID NO: RW10396363/22

ANNEXURE C3.2 - SCOPE OF WORK

**REFURBISHMENT OF SUCTION AND DELIVERY PIPEWORK INCLUDING LETHABO
HEADER, DESIGN, AND SUPPLY, INSTALL, AND PUT INTO OPERATION OF THE
DRAINAGE PUMP SYSTEM, AND MAIN PUMP COOLING WATER SYSTEMS AT LETHABO
INTAKE STATION**

SPECIFICATIONS

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PART 1 – GENERAL SPECIFICATION

PART 1.1 PS1 DESCRIPTION OF THE WORKS

1.1 Employer's objectives

The Employer's objective is to complete the construction work, commission and put into operation of the B11 and B19 Header. Refurbishment Rotary Screens and replacement of main pumps cooling water pumps and installation of drainage pumps at Lethabo Pump station.

1.1.1 Background

Lethabo Intake Station was constructed in 1982 under the AWS (1982) Scheme. It is the primary source of supply of raw water to Vereeniging Pumping Station and Eskom Lethabo Power Station. Vereeniging Pumping Station received approximately 1200MI/d through 4x450 MI/d pump-sets (i.e. 4 TO 7) to Vg via an inflexible distribution manifold which joins the B11 Pipeline. Raw water to Eskom Lethabo Power Station is supplied through 3x105 MI/d pump-sets (i.e. 1 TO 3). To date, the existing infrastructure is no longer adequate to cater for the needs that have risen with the new demands in terms of water supply due to a number of reasons.

The header replacement execution of the works was started but not completed, as a result the already installed valves and pipes have to be removed and refurbished having stood without working for a long time. New valves, valve chambers, pipes, pipe specials and associated mechanical, electrical and automation equipment have to be constructed and installed. Additionally, the rotary screens have to be refurbished and replaced.

1.2 Overview of the works

1.2.1 Pipe line Scope of Works

The Pipeline scope of work for Lethabo Header shall comprise of earthworks, construction of delivery manifolds, pipeline modifications of existing manifolds, valve chambers construction, supply and installation of valve, supply of pipes, installation and testing.

Pipe laying of steel pipes shall comply to SABS 1200 specifications, variations and additions to the standardized specifications applicable to this contract and technical specifications of Rand Water for work that falls outside of specification.

Pipe sizes vary between 400mm, 1800mm and 2000mm in nominal diameter (including bends, valves and other fittings) and approximately shall be supplied and installed.

Reinforced concrete chambers shall be constructed to accommodate varying valves' and pipes' sizes as per the above mentioned pipe sizes.

The Contractor's obligations under the contract pipeline works of comprise the following:

- The sourcing and purchase of all pipes, pipe specials, valves and any instrumentation necessary not supplied by RandWater.
- The Contractor must provide all resources and supply all equipment and materials needed for the successful installation of the pipes and manifolds line.

The work to be performed by the Contractor:

- Expose and measure to confirm the size of existing pipes before supplying of any pipe fittings. Also check the ovality and weldability of the existing pipeline.
- Submit the revised method statements and risk assessment documentation for acceptance by the Employer. Other works may require the Contractor to present the method statements and risk assessment plans to the Employer.
- Expose by hand all underground services 1(one) week before the commencement of the construction process in the area of such services.
- Protection of the Sasol Pipeline at all costs during construction.
- Excavate, blasting of rock and bedding within as per SANS 1200 – DB & LB
- Inspect and collect from Emhlangeni Pipe Plant, unload onto sandbags, laying, joint and test pipes and fittings as per SANS 1200 L within the pipe trench. Also install all bends, sluice valves, reflux valves, butterfly valves, magflow meters and pipe work connections at the start, cross connections and the end at the intake station along the pipeline.
- Complete and repair the protective coatings as specifications for external coating and internal lining.
- Backfill the trench with fill material according to specification. Dispose of surplus material and reinstate the topsoil and surface area.
- Constructing the valve chambers and complete all the associated steel work required within the chambers.
- Constructing Roads, parking areas and services etc.
- Pressure testing of the completed pipeline to required procedures.
- Conducting CCTV inspections along the full length of pipeline and manifold prior to internal handover of the pipeline as specified in the bid document
- Submission of all required documentation with handover (internal and external) of the pipeline.
- Replacement of the existing air valves for existing pipelines for B5 and B11 as indicated on the drawings.
- Installation of the additional air valves as recommended by the Surge Analysis report

Other requirements of the Contractor:

- Evaluation and commenting on the design package when a problem on site during construction occurs, identifying possible opportunities to reduce cost- and contract duration while not compromising the integrity, safety and quality of the project.
- Informing the Engineer of any design changes, for acceptance, prior to implementation.
- Establishing the risk plan associated with the implementation of the contract.
- Receiving, securing and installation of all free-issued items if any.
- Supply, delivery and installation all required plant and material to site.
- Adherence to Quality Control Plan (QCP) requirements by the Contractor and his sub-Contractors.

Taking over of the Works:

- The take-over process shall divided into four phases with Phase 1 to be completed first.
- The responsibility for operation and routine maintenance passes to the Employer at Completion. The Contractor ensures clean-up requirements at Completion and ensures that it is implemented. The Contractor transmits a complete set of marked-up drawings to the Employer before the testing of the Works.
- The Contractor compiles quality control (QC) hand-over documentation files (Data-pack which must be keep up to date as the project progresses) for each piece of material individually which consists of:
 - Notice and acceptance of completion form;
 - Checkout conformation form;
 - Checklist applicable to Equipment;
 - Punch / Defects list;
 - Certificate of compliance by an accredited person for the portion of installation;
 - Tests, calibration, material, SABS and QC certificates;
 - Completed data sheets; and
 - Accepted for construction drawings.
 - Relevant drawings;
 - Material certificates indicating material compliance and type;
 - Engineering and design changes
 - Safety requirements for installation and maintenance;
 - The detailed maintenance procedure documentation;
 - Fabrication and inspection plan;
 - List of tagged items for transport and construction;
 - Internal verification documents;
 - Guarantees that the Contractor and his Sub-contractor's or suppliers provide;
 - A list of Equipment to undertake NDE.

1.2.2 Mechanical Scope of Work

The mechanical scope of work shall comprise s of:

- B19 and B11 Header

Valves removal, manufacture, testing, supply, delivery, installation and put into service of isolation vales, non- return valves, surge anticipation valves, air valves and submersible pumps complete with piping, non-return valves and fittings, removal and refurbishment of installed isolation valves.

- Pumps and Rotary Screens Refurbishment

Design, supply, delivery, installation and put into service of pumps cooling water systems, drainage pump system complete with pumps, motors, pipes and fittings, supply and replace main suction and delivery pipes and valves, supply and delivery of 450 MI/d pump casing. Refurbishment of four (4) rotary screens at LETHABO INTAKE STATION.

The work to be performed shall include but not limited to the following:

- Design, supply, delivery, installation and commissioning of cooling water system.
- Design, supply, delivery, installation and commissioning of drainage pump system.
- Supply and delivery of 450 MI/d pump casing.
- Removal and refurbishment of four (4) butterfly valves and deliver to Rand Water Central Depot.
- Manufacture, testing, supply and delivery of eleven (11) electrically actuated isolation valves complete with mating flanges. Each isolation valve shall be supplied complete with a gearbox, actuator unit, actuator extension and valve supports.
- Refurbishment of four (4) rotary screens.
- Manufacture, testing, supply and delivery nine (9) air valves complete with isolation valves and fittings etc.
- Manufacture, testing, supply and delivery five (5) Non return valves complete with matting flanges and fittings etc.
- Manufacture, testing, supply and delivery five (5) Surge Anticipation Valves (SAV)
- Manufacture, testing, supply and delivery fourteen (14) chamber drainage submersible sump pumps complete with non-return valves, isolation valve, delivery pipe work, clamps and fittings etc.
- Supply, delivery, installation and commissioning of suction and delivery pipework, valves and fittings (for the four (4) 450 MI/d pump-sets).
- Removal, transportation, refurbishment and relocation of steel Hammer Water tank
- Installation, commissioning and putting into service of all the supplied equipment
- Training of Rand Water personnel

- Preparation and submission of as built documentation including comprehensive operating and maintenance manuals

The Contractor shall provide all labor, supervision, installed and consumable materials, equipment, tools, services and all permanent or temporary items necessary for the manufacture, supply and delivery, unloading, installation and putting into service of the specified deliverables.

1.2.3 Electrical Scope of Work

The electrical scope of work shall comprise of the design, manufacture, supply, installation, commission, and put into service of the electrification of boundary valves at Lethabo Intake Station. The Contractor shall provide all labour, supervision, installed and consumable materials, equipment, tools, services and every permanent or temporary items necessary for the manufacture, refurbishment, supply, delivery, unloading, installation, commissioning and putting into service of the specified electrical deliverables. The electrical contractor shall have prior experience in handling interdisciplinary projects of a similar quantity/description of this project.

The work comprises of the following items as a minimum:

- Identifying points of supply from the Lethabo Intake Station 400V Switchgear, essential services section.
- Design, Manufacture, test at factory, supply, test on site, install, commission and put into service Main Distribution Board fed from generator power complete with a UPS distribution section and UPS unit compartment.
- Design, Manufacture, test at factory, supply, test on site, install, commission and put into service Uninterruptable Power Supply Unit to feed the flow meters.
- Design, Manufacture, test at factory, supply, test on site, install, commission and put into service Distribution Boards for the boundary valve chambers.
- Design, Manufacture, test at factory, supply, test on site, install, commission and put into service Distribution Boards for the flow meter chambers.
- Design, Manufacture, test at factory, supply, test on site, install, commission and put into service Control Panels for the sump pumps in the chambers.
- Design, Manufacture, test at factory, supply, test on site, install, commission and put into service Isolation Panels for all electrical driven motors.
- Design, Manufacture, test at factory, supply, test on site, install, commission and put into service Small power and lighting for each chamber in the installation.
- Design, supply, test at factory, test on site, install, commission and put into service all Cabling required for the electrification of the installations.
- Design, supply, test at factory, test on site, install, commission and put into service all Cable racking systems required for the laying and supporting of cable in the installation.

- Design, install, commission and put into service the required Cable trenching for the underground laying of cable in the installation.
- Design, install, commission and put into service the required Earthing and lightning protection for the installation.
- Decommissioning of redundant electrical equipment post completion of the installation
- Provision of all required Electrical documentation including, method statements, detailed design reports, detailed design drawings, HAZOP reports, for construction drawings, QCPs, As built drawings, operational and maintenance manuals, to name a few.
- Training of Rand Water personnel
- Preparation and submission of as built documentation including comprehensive operating and maintenance manuals

1.2.4 Automation Scope of Work

The Automation scope of this project is to automate all the valves in the header. Also, the existing pumpset delivery venturi flow meters are to be removed and replaced with new magnetic flow meters. The new valve actuators and flow meters are to be connected to the pumpset and common services PLC, displayed and controlled on plant SCADA. The new B19 pipeline will consist of a magnetic flow meter forming part of this scope.

1.2.5 Civil Scope of Works

The Civil Scope of work consists of the construction of reinforced concrete Valve & Meter chambers, supply and erection of precast concrete units and fabrication and installation of structural steel access platforms. This will also involve design and erection of soil stability measures or shoring (by the contractor), excavation, importing suitable material and backfilling. All construction work needs to be according to all applicable listed standard specifications, together with variations contained herein and other Rand Water technical specifications or contract documents.

The civil works to be performed by the Contractor will also include, but may not be limited to: (the list below is non-exhaustive and is to be read in conjunction with the project drawings and technical specifications – where omissions are identified the Biding contractor should notify the Engineer):

- a) Provide a construction methodology to be approved by the Engineer

- b) Fencing off around designated site areas
- c) Surveying and setting out of works (including generating survey drawings and supply survey information in native format)
- d) Accommodation of traffic along existing road maintaining entry and access for the Employer's staff
- e) Relocation and/or protection of existing services and structures
- f) Services detection (including detecting the location and depth of services)
- g) Excavation and Earthworks including dealing with water in excavations, as well as confirmation of founding conditions (by an appointed Professionally Registered Geotechnical Engineer)
- h) Demolishing of existing valve chambers (refer to Setting Out Layout R09160/002) and as listed in the BoQ and disposal of rubble to an approved disposal site
- i) Design and construction of a shoring system for vertical excavations
- j) Construction of water tight chambers
- k) Backfilling with imported material or as prescribed by the Geotechnical investigation or construction drawings
- l) Reinstatement of structures damaged or relocated during construction to their pre-construction condition / location.
- m) The rectification of defects during the "Defects Liability Period"

1.2.5.1 LIST OF DRAWINGS (CIVIL)

The following drawings form part of the Bid Document and are separately issued as a "RA 9160_001 DRAWING REGISTER-M11". These drawings are for bid purposes only. A set of construction drawings will be issued to the contractor on the commencement date.

These drawings are to be read in conjunction with relevant drawings from other disciplines.

ITEM NO.	DRAWING NO.	DRAWING TITLE
1	R0_9160/200	General Arrangement of floor plan layout for chambers 2A, 2B and 11
2	R0_9160/201	General Arrangement of valve chamber 2A: 1.8m Mag flow + 1.4m Non-Return + 1.8m Butterfly + 0.4m Surge Anticipation Valves
3	R0_9160/202	General Arrangement of valve chamber 2A: 1.8m Mag flow + 1.4m Non-Return + 1.8m Butterfly + 0.4m Surge Anticipation Valves
4	R0_9160/203	General Arrangement of valve chamber 3 for 2000mm diameter butterfly valve
5	R0_9160/204	General Arrangement of valve chamber 4 for 2000mm

		diameter butterfly valve
6	R0_9160/205	General Arrangement of valve chamber 5 for 1800mm diameter butterfly valve
7	R0_9160/206	General Arrangement of valve chamber 6 for 800mm diameter butterfly valve
8	R0_9160/207	General Arrangement of valve chamber 7 for 800mm diameter butterfly valve
9	R0_9160/208	General Arrangement of valve chamber 8: 1.8m Mag flow + 1.4m Non-Return + 1.8m Butterfly + 0.4m Surge Anticipation Valves
10	R0_9160/209	General Arrangement of valve chamber 8: 1.8m Mag flow + 1.4m Non-Return + 1.8m Butterfly + 0.4m Surge Anticipation Valves
11	R0_9160/210	General Arrangement of valve chamber 9: 2.5m Mag flow
12	R0_9160/211	General Arrangement of valve chamber 2B: 1.8m Mag flow + 1.4m Non-Return + 1.8m Butterfly + 0.4m Surge Anticipation Valves
13	R0_9160/212	General Arrangement of valve chamber 2B: 1.8m Mag flow + 1.4m Non-Return + 1.8m Butterfly + 0.4m Surge Anticipation Valves
14	R0_9160/213	General Arrangement of valve chamber 11 for 1800mm diameter mag flow
15	R0_9160/214	General Arrangement of valve chambers 12 and 14: 1.8m Mag flow + 1.4m Non-Return + 1.8m Butterfly + 0.4m Surge Anticipation Valves
16	R0_9160/215	General Arrangement of valve chamber 12: 1.8m Mag flow + 1.4m Non-Return + 1.8m Butterfly + 0.4m Surge Anticipation Valves
17	R0_9160/216	General Arrangement of valve chamber 13 for 2000mm diameter butterfly valve
18	R0_9160/217	General Arrangement of valve chamber 15 for 1800mm diameter mag flow

The Civil Technical Specification will be issued as a separate document on CD OR USB FLASH DRIVE to be issued with the Bid

1.3 Taking over of the Works:

- The responsibility for operation and routine maintenance passes to the Employer at Completion. The Contractor ensures clean-up requirements at Completion and ensures that it is implemented
- The Contractor transmits a complete set of marked-up drawings (as “as-built” drawings) to the Employer before the testing of the Works. **Completion certification and or taking-over certificates (as appropriate) will be withheld until drawings**

are marked up with correct “as-built” information and are submitted to the Engineer.

- The Contractor compiles quality control (QC) hand-over documentation files (Data-pack which must be kept up to date as the project progresses) for each piece of material individually which consists of :
 - Notice and acceptance of completion form;
 - Checkout conformation form
 - Checklist applicable to Equipment :
 - Punch / Defects list;
 - Certificate of compliance by an accredited person for the portion of installation;
 - Tests, calibration, material, SABS and QC certificates;
 - Completed data sheets;
 - Accepted for construction drawings
 - Relevant drawings;
 - Material certificates indicating material compliance and type;
 - Engineering and design changes
 - Safety requirements for installation and maintenance
 - The detailed maintenance procedure documentation
 - Fabrication and inspection plan
 - List of tagged items for transport and construction
 - Internal verification documents
 - Guarantees that the Contractor and his Sub-Contractor’s or suppliers provide;
 - A list of equipment to undertake NDE.
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1.5 Location of and access to the works

The works are at Lethabo Intake Station in Free State. All the pipework will be constructed within the confined perimeter of the pump station site.

1.6 Work carried out by others

There are no works planned for execution by other contractors under this scope of work. The following will, however, be noted with regards to required interaction and liaison with other contractors and/or those carrying out other activities:

- i) Certain constraints may exist in the supply of new pipes. Rand Water will endeavour to provide a schedule for the availability of pipes but it will however, remain the responsibility of the contractor to plan the execution of the works to accommodate the scheduled availability of pipes and to use what pipes are available to best effect within the programme.

1.7 Free-issue materials

Some material will be supplied by Rand Water to the Contractor as free-issue materials. These will include:

- a) All pipes as free issue materials. The Contractor shall collect all pipes around the site and deliver these for refurbishment;
- b) Transport the refurbished pipes and specials to the point of installation and offload onto sand bags
- c) Pipe beacons (markers);
- d) Valve chamber covers;
- e) Water meters.

The Contractor shall:

- Submit timely notification that the items as noted above are required;
- Liaise the relevant Rand Water staff and/or with suppliers/manufacturers;
- Collect the free-issue materials from stores or locations stated in the Particular Specifications and deliver to site;
- Store materials in a suitable manner on site until such time as they are removed by the Contractor to be built into the works.

1.8 Geotechnical information

There is no Geotechnical information available.

1.9 Occupational health and safety

The Employer's Occupational Health and Safety (OH&S) Specifications have been included under Part 3 of the Specifications in this document. The Contractor shall comply with all requirements of the OH&S specifications.

1.10 Environmental Management Plan

The Environmental Management Plan (EMP) is included in Part 4 of the Specifications.

1.11 METHOD STATEMENTS AND QUALITY REQUIREMENTS

1.11.1 Method statements:

The Contractor shall prepare method statements for submission with his bid. A method statement will be required for each and every activity to complete the works.

Rand Water to check and accept these method statements and give written permission for proceeding of any work. The workforce is to be briefed on each method statement and Rand Water's safety inspectors will query the workforce periodically to confirm that this is taking place. The following headings will be required for each method statement;

- Goal of activity
- Person responsible
- Dangers identified
- Safety measures to be instituted based on risk assessment
- Work methodology
- Personnel and plant and equipment
- Clearing of site
- Diagrams, sketches drawn to scale
- Timeframes and indication if the activity is on a critical path or not
- Other headings can be included.

1.11.2 Quality requirements:

The Contractor complies in full with the Employer's quality requirements. During execution of the Bid no actions to provide the Works are implemented at any part of the site before the relevant quality control documentation is submitted and the Engineer accepts the procedures.

The Contractor is responsible for the complete quality assurance requirements imposed on his Sub-contractors and suppliers, in terms of SABS ISO 9000 Series.

The Contractor is responsible to inspect, expedite, administer and monitor in a pro-active manner Sub-contractors and supplier's work and the enforcing of the terms and conditions of their Bids, except where extraordinary circumstances warrant the inclusion of Employer's participation.

A Quality Control Plan (QCP), which includes hold points and an inspection plan are provided by the Contractor to the Engineer for all fabrication, supply (transport) and installation of components for approval prior to start of manufacturing. The Employer uses or modifies the Contractor's QCP's and this includes inspection hold points, dimensional checks, material quality checks, tagging procedure for items, etc.

The Contractor shall submit 3 (three) copies of his QCP to the Engineer for review and acceptance within 2 (two) weeks after the bid is awarded.

1.11.3 Contractor's QA/QC responsibilities:

All machinery, material and workmanship to comply with the appropriate specifications and codes, and bear the official mark of such specifications and codes;

All machinery and material is new and of the most suitable grade, and suitable to withstand and to operate satisfactorily under all possible climate and weather conditions which are reasonably expected at the Site. Such machinery and material is subject to

inspection and/or test by the Supervisor, who is granted access by the Contractor and Sub-Contractor.

The Contractor conducts a continuous programme of construction quality control for all work performed on the Site. All relevant inspections and tests are adequately documented and signed off by the Supervisor;

The Contractor complies with any quality assurance procedures required by the Employer.

The Supervisor monitors the Contractor's adherence to quality requirements independently. Any rejections by the Supervisor based on design, specifications, codes and the like is binding.

1.12 Quality audits:

The Employer reserves the right to perform quality audits at any time during the execution of the Works.

The Contractor gives 48 (forty-eight) hours' notice (in writing) to the Supervisor, prior to testing. The Supervisor exercises the option to witness or not, such tests.

1.13 Inspection authority:

If an authorized inspection authority (AIA) is appointed and he is paid for by the Employer, in terms of the OHS act, the Engineer will compile and submits the scope of work for the AIA.

1.14 CONSTRUCTION PROGRAMME

The bid must include a programme in bar chart format to indicate the expected duration and completion dates of all tasks.

The Contractor's programme must include the following, as per section of work:

- Rand Water Deliverables Dates – Contractor shall request dates prior to the activity taking place
- EMP, ROD and Health and Safety conditions and requirements
- Contracted dates
- Sub-contractor activities and interface points.
- Activity duration
- Activity inter-dependency
- Activity early start and finish dates
- Activity late start and finish dates
- Free and total float for each activity

- Critical path/s indication

The following reports are required as supporting documentation to the programme:

- Time analysis print-out
- Critical activities report
- Resource schedules and histograms

It is the Contractor's responsibility to assess the available data and available knowledge explicitly. Any technical detail, policies, imposed organisational conditions, contract conditions; specification, overall programme constraints, resource availability or any other factor of significance to implement the project successfully must be identified by the Contractor.

Based upon the assessment described above the Contractor decides on what level to breakdown to for his internal planning purposes.

The Bidder will be expected to submit the indicated actual progress against this approved bar chart (planned) programme in all progress reports during the execution of the project.

The Contractor has to submit a weekly labour alert report, if the Contractor's available manpower is not sufficient to meet the time schedule, for performance of the work.

During the latter stages of accomplishing work and prior to delivering notice of completion, the Contractor submits his plan for demobilisation at job site to the Contract Manager for acceptance and it complies with such demobilisation plan as accepted by the Employer.

The Contractor submits a procurement schedule for the procurement and receipt of material and sub-contract services and a monthly status report on these items.

The Contractor commences with the work in accordance with the accepted schedules, or such other date(s) mutually agreed between the Contractor and the Contract Manager and completes the work not later than the mile stone dates and Completion Date indicated on the Accepted Programme.

If the Contractor fails to complete any part of the Works according to schedule or it becomes apparent to the Contract Manager that the work is not completed according to schedule and if such failure is due to the Contractor then the Contractor submits his plan of action to deal with the delay and the Contractor reports on daily on the success of his plan of action.

The Contractor shall maintain a rate of progress of the excavation work, preparation of the trench floor, the pipe bed, backfilling and reinstatement not less than the stipulated in the programme. In this connection continuous stretches of trench shall be excavated

and rock and hard outcrop shall be removed as encountered. The presence of rock shall not be accepted as a factor delaying the rate of progress.

The Contractor is required to give Rand Water shut down notices 56 days in advance to enable him to tie into the existing pipelines. A total of shut downs anticipated for the duration of the contract will be supplied by Rand Water.

Rand Water shall not be liable for any additional costs incurred by the Contractor while the work proceeds at a rate slower than the average rate as set out in the programme.

The Contractor is required to furnish a realistic programme showing the order of procedure and methods which he proposes to use in executing the Works within 7 days from the date of delivery of the letter of acceptance. The Contractor shall allow for preparing the Safety and Quality Plans (the Contractor's responsibility) and subsequent approval thereof by Rand Water prior to work commencing on site. All labour of the Contractor will be inducted prior to be allowed on site to perform any work; this applies for the full duration of the project

The Contractor shall submit an updated copy of the programme at each site meeting clearly indicating actual versus scheduled progress. The contractual programme must be submitted in Microsoft Project format (latest version) and in hard copy at each site meeting and if any change or delay has impacted on the critical path. Fourth nightly construction work programs must be submitted to the Engineer throughout the duration of the contract.

1.15 SITE MEETINGS

The Contractor shall attend weekly technical and production meetings and monthly project progress meetings with representatives of Rand Water and the Engineer at dates and times determined by Rand Water.

1.16 FEATURES REQUIRING SPECIAL ATTENTION

1.16.1 Public safety

During the performance of the work the Contractor erects and maintains temporary fences, shoring, bridges, railings, and barriers and takes all other precautions including keeping the excavations dewatered and places proper guards for the prevention of accidents; puts up and maintains signs, notices and sufficient lights. He indemnifies the Employer from all damages and costs to due to injury to person or property damage resulting from the Contractor's negligence or carelessness in the implementation of the Works, or in guarding the same, or from any improper materials or equipment used in its construction, or by or on account of any act or omission of the Contractor.

In addition, the Contractor takes all practical precautions to prevent the public from being injured.

1.16.2 Damage to public and/or private property

The Contractor indemnifies and keeps indemnified Employer against all losses and claims for injuries or damage to any person or property whatsoever which arises out of or in consequence of the construction and maintenance of the Works and against all claims, demands, proceedings, damages, costs, charges and expenses whatsoever in respect thereof or in relation thereto.

The Contractor confines his activities to the minimum possible width. As far as possible the Contractor avoids unnecessary damage to buildings, structures, reservoirs, canals, roads, pavements, parks, trees, gardens, fences, gates, walls and other ground level services, etc. The liability for all necessary and reasonable damage within a width to be pre-determined by the Contract Manager and conveyed in writing to the Contractor is borne by the Employer, the Contractor is liable for all unnecessary and unreasonable damage, the cost of repair and reinstatement of which is deducted from monies due to the Contractor. Provision has been made that the working strip be temporarily fenced off during construction activities. In urban areas very careful coordination and management of construction activities are required. Specific stretches shall be demarcated to widen the access along the pipeline route to accommodate traffic to pass in both directions.

These areas will be agreed in writing by the Engineer in liaison with the Property Owner prior to construction starting. The Contractor must keep photographic record in digital format of all stages of construction (prior, during and after completion), along the full length of the pipeline. A digital and a hard copy thereof should be made available to the Engineer and the relevant Property owner for the full duration of the contract and be included in the Handover documentation at the completion stage.

PART 2 - PROJECT SPECIFICATION

PART 2.1 PS 2 PROJECT SCOPE OF WORK

PART 2.1.1 CIVIL AND PIPELINE

All Civil and Pipeline works will be executed in accordance with the applicable SABS 1200 series specifications and the Rand Water documents RW 10396363/22-LETHABO INTAKE STATION Header Upgrade Civil Specification and SAM DOP 00001TS - Technical Specification for pipeline excavation, Backfilling and Pipe Laying, Special and Testing and Investigation And Returnable Schedule (TS) provided on the CD OR USB FLASH DRIVE issued with this bid.

- List of Applicable Drawings

All applicable pipeline drawings are listed on drawing **RO 91601/001**-Drawing Register which is provided on the CD OR USB FLASH DRIVE issued with this bid.

PART 2.1.2 MECHANICAL

2.1.2.1 Mechanical Scope of Work

The Mechanical Scope of Work shall comprise of removal, manufacture, supply and installation of Header valves. Design supply, install of drain pumps, pump suction and delivery valves, refurbishment pumps and rotary screens.

- B11 and B19 Header

Detail mechanical scope of work for the B11 & B19 Header is provided in the Mechanical system specification document issued with this bid **RW10396363/22/Mech-Spec: Mechanical Specification**

- Dewatering and Colling water Pumps & Rotary Screens Refurbishments

Detail mechanical scope of work for Engine Room Pumps and Refurbishments is provided in the Mechanical system specification documents issued with this bid **RW10396363/22/Pumps/Screens-Refurb/Spec Mechanical Refurbishment specification.**

2.1.2.2 Mechanical Returnable Schedule

The contractor shall fill and submit with this contract fully completed returnable schedule for B11& B19 Header and Engine Room Pump Refurbishment document

RW10396363/22/Mech-R-S and **RW10396363/21/Pumps/Screens-Refurb/R-S** respectively.

2.1.2.3 List of Drawings

- B11 and B19 Header

A list of applicable mechanical drawings for this contract is provided in the mechanical system Specification document **RW10396363/22/Mech-Spec** clause 5, issued with this contract. These drawings are provided on a CD OR USB FLASH DRIVE as part of this contract.

- Dewatering and Colling water Pumps & Rotary Screens Refurbishments

A list of applicable mechanical drawings for this contract is provided in the mechanical system Specification document **RW10396363/22/Pumps/Screens-Refurb/Spec** clause 6, issued with this contract. These drawings are provided on a CD OR USB flash drive as part of this contract.

2.1.2.4 List of Specification

- B11 and B19 Header

A list of applicable mechanical specifications for this contract is provided in the mechanical system Specification document **RW10396363/22/Mech-Spec** clause 4, issued with this contract. Only Rand Water Specifications are provided on a CD OR USB flash drive as part of this bid (Rand Water shall not provide any National or International Standard listed)

- Dewatering and Colling water Pumps & Rotary Screens Refurbishments

A list of applicable mechanical specifications for this contract is provided in the mechanical system Specification document **RW10396363/22/Pumps/Screens-Refurb/Spec** clause 5, issued with this contract. Only Rand Water Specifications are provided on a CD OR USB FLASH DRIVE as part of this bid (Rand Water shall not provide any National or International Standard listed)

2.1.3.4 Mechanical Bill of Quantities (M-BOQ)

Detail of items for design and equipment to be supplied for mechanical drain pumps and cooling water pumps shall be detailed as indicated in M-BOQ Supplied in **Appendix C** of this document

PART 2.1.3 - ELECTRICAL

2.1.3.1 Electrical Scope of Work

The Electrical scope of work shall cover the verification, manufacture, modify, construct, commission and put into service of already installed electrical equipment at Engine Room 3B at Palmiet pumping station, and to supply equipment that has not yet been installed to complete the electrical installation.

Detail Electrical scope of work is provided in the Electrical System Specification document issued with this bid **RW10396363/22/Elec-Spec: ELECTRICAL SYSTEM SPECIFICATION**

2.1.3.2 Electrical Returnable Schedule

The contractor shall fill and submit with this contract a fully completed returnable schedule document **RW10396363/21 /Elec-R-S** issued with this bid.

2.1.3.3 List of Drawings

A list of applicable electrical drawings for this contract is provided in the mechanical system Specification document **RW10396363/22/Elec-Spec** clause 6, issued with this bid. These drawings are provided on a CD OR USB FLASH DRIVE as part of this contract.

2.1.3.3 List of Specification

A list of applicable mechanical specifications for this bid is provided in the mechanical system Specification document **RW10396363/22/Elec-Spec** clause 7, issued with this bid. Only Rand Water Specifications are provided on a CD OR USB FLASH DRIVE as part of this bid (Rand Water shall not provide any National or International Standard listed)

2.1.3.4 Electrical Bill of Quantities (E-BOQ)

Detail list of items to be supplied under the electrical scope shall be detailed as indicated in E-BOQ Supplied in **Appendix A** of this document

PART 2.1.4 AUTOMATION

2.1.4.1 Automation Scope of Work

The Automation scope of work shall cover the design, supply, install, commission, and put into service of Automation equipment, instrumentation and cabling for Lethabo Header Upgrade and associated pumps and valves at Lethabo Pump Station.

Detail Automation scope of work is provided in the Automation System Specification document issued with this **RW10396363/22-Aut-Spec** - Automation System Specification

2.1.4.2 List of Drawings

A list of applicable electrical drawings for this contract is provided in the mechanical system Specification document **RW10396363/22-Aut-Spec** clause 2.1.1, issued with this bid. These drawings are provided on a CD OR USB FLASH DRIVE as part of this contract.

2.1.4.3 List of Specification

A list of applicable mechanical specifications for this bid is provided in the mechanical system Specification document **RW10396363/22-Aut-Spec** clause 2.1.2, issued with this bid. Only Rand Water Specifications are provided on a CD OR USB FLASH DRIVE as part of this bid (Rand Water shall not provide any National or International Standard listed)

2.1.4.4 Automation Bill of Quantities (A-BOQ)

Detail list of items to be supplied under the Automation scope shall be detailed as indicated in A-BOQ Supplied **Appendix B** of this document

PART 2.2 PS 3: VARIATIONS AND ADDITIONS TO THE STANDARDIZED SPECIFICATIONS

CONTENTS

- PSA: GENERAL (SABS 1200 A – 1986)
- PSAB: ENGINEER'S OFFICE (SABS 1200 AB – 1986)
- PSC: SITE CLEARANCE (SABS 1200 C – 1980 as amended 1982)
- PSDA: EARTHWORKS (SMALL WORKS) (SABS 1200 G – 1982)
- PSDB: EARTHWORKS (PIPE TRENCHES) (SABS 1200 DB – 1989)
- PSGA: CONCRETE (SMALL WORKS) (SABS 1200GA – 1982)
- PSCC1: CONSTRUCTION WORKS – CONCRETE WORKS (STRUCTURAL)
- PSHA: STRUCTURAL STEELWORK (SUNDRY ITEMS) (SABS 1200 HA – 1990)
- PSLB: BEDDING (SABS 1200LB – 1983)

PART 2 - VARIATIONS AND ADDITIONS TO THE STANDARDISED SPECIFICATIONS

PSA: GENERAL (Applicable SABS 1200 A – 1986)

PSA 3 MATERIALS

PSA 3.1 QUALITY OF MATERIALS

Add the following:

All materials are to be the best of their respective kinds, new, undamaged, sound and free from defects and shall comply with the relevant clauses of the Specification.

All references to Standard Specifications are to the latest amendment to such specifications.

Materials bearing the SABS or BS mark will not be subjected to tests to determine whether they comply with the relevant specifications. The Engineer may in his discretion require any material not bearing such mark to be tested in accordance with the relevant specifications; should he do so the Contractor shall arrange for such tests to be carried out at the Contractor's cost by the South African Bureau of Standards or other approved body.

Whether or not the material bears the mark or is tested, any material found not to be in accordance with the specification shall be rejected and replaced by the Contractor at his own cost.

Bidders may be required, at their own expense to submit samples of the material offered to the Engineer for his approval and the material supplied under this contract shall be of a standard equal to that of the samples so submitted and approved. Samples will remain the property of the Bidders, who shall remove them when called upon to do so by the Engineer.

Add the following new sub-clause:

PSA 3.3 DELAY DUE TO SUPPLY OF MATERIALS

The Contractor shall ensure that the work is not delayed due to the lack of materials on the site of the works, by placing orders with suppliers for the materials required under this contract as soon as possible after the acceptance of this bid.

The Contractor shall, by producing copies of written orders or written enquiries for supplies, prove to the satisfaction of the Engineer that any delay occasioned by non-availability of materials has been caused by the inability of suppliers to supply

and not by his own lack of timely ordering or lack of exhaustive enquiry for supplies, before any extensions of the contract time will be allowed due to such delays.

PSA 4 PLANT

Add the following new sub-clauses:

PSA 4.2 Contractor's Office, Stores and Services

The Contractor's camp shall be kept neat and clean at all times and all surplus or rejected material shall be removed from the site.

The Contractor will not be allowed to provide living accommodation for staff at the Contractor's Site Camp. Overnight accommodation for security staff will be allowed.

PSA 4.3 CONSTRUCTION PLANT

Construction plant shall be of a suitable type for carrying out the work for which it is required. Its capacity shall be sufficient to meet the requirements of the work within the contract time. It shall be kept at all times in full working order and repair.

PSA 5 CONSTRUCTION

PSA 5.1 SURVEY

PSA 5.1.1 Setting out of the Works

Setting out details of all the works are defined by offsets from pegs and bench marks established by the Engineer. The Contractor shall be responsible for the setting out of the works with reference to these pegs and bench marks. The Contractor shall be responsible for taking and plotting cross-sections at 20m intervals and for the calculation of earthworks quantities.

PSA 5.4 PROTECTION OF OVERHEAD AND UNDERGROUND SERVICES

Add the following to this sub-clause:

The Contractor shall adequately protect his work from possible damage caused by overflowing sewerage manholes and broken water pipes, whether caused by the Contractor or not.

Add the following new sub-clauses:

PSA 5.7 SAFETY

Add the following to this Sub-Clause:

All work and particularly work carried out in the proximity of buildings, dwellings, tanks or other structures shall be carried out in conformance with the regulations framed under the Occupational Health and Safety Act, 1993 and the Minerals Act, (Act 50 of 1991) (including shoring where necessary) to ensure the safety.

The Contractor shall make available for the duration of the contract safety helmets, gumboots and any other necessary safety equipment for sole use by the Engineer and his representatives(s).

Add the following new sub-clause:

PSA 5.9 SECURITY

PSA 5.9.1 Security of Contractor's Plant and Personnel

The Contractor shall note that, notwithstanding any insurances, the Contractor shall be responsible for the effecting of safety and security of plant and personnel on and around the site of the works, and that no claims in this regard will be entertained by the Employer.

The Contractor's attention is drawn to the fact that the work is to be carried out in an area where there is the incidence of criminal activity may occur.

The sum entered by the Contractor in the Schedule of Quantities for effecting of safety and security of plant and personnel on and around the site of the works shall be deemed to include full compensation for all the measures necessary to effect the safety and security including, where necessary, the employment of the services of a security organization.

PSA 5.9.2 Security for the Engineer

The Contractor shall, where called upon to do so by the Engineer, arrange for such security measures or security services as may be required. The cost of providing these services shall be refundable to the Contractor, who shall be responsible for making the necessary arrangements and effecting payment. Where these services are contemplated in advance, allowance has been made for the cost thereof by the inclusion of a Provisional Sum in the bid documents.

In instances where necessary, the Contractor shall arrange and pay for the services of a security organization to safeguard site personnel. The cost of providing these services shall not be refundable to the Contractor.

PSA 5.9.3 Methods of Construction. (Subclauses 5.3, 5.4, 5.5, 5.6 and 5.7).

Except where acceptance of the Contractor's proposed methods of construction is stated in the letter in which the bid is accepted, acceptance of the bid does not signify acceptance of such methods of construction and it does not in any way relieve the Contractor of any of his responsibilities for the Works, and it shall not be used as a basis for claiming compensation where the proposed methods of construction do not comply with the requirements of the specifications and are not approved subsequent to the award of the contract.

PSA 5.10 Accommodation and Temporary Deviation of Traffic. (*Read with SANS 1921-2 Part 2*)

The contractor shall ensure that the excavations are protected at all times and adequately lit at night in terms of the Occupational Health and Safety Act. The Contractor shall provide, erect and maintain temporary road traffic signs that conform to the requirements of the "South African Road Traffic Signs Manual" as published by the CSIR in positions where open cut road crossings are required.

An adequate number of warning lights and/or flagmen and appropriate barricades, clearly visible to oncoming traffic, shall be provided at all times. If steel drums are used, they shall be ballasted with soil, sand, or stones and shall be white on the outside with reflective material. Nothing will be allowed to be placed on top of the drums and shall be maintained in a clean and effective condition.

The Contractor shall:

- i. Construct such temporary accesses, roads, walkways, bypasses and/or parking areas as may be required to safely accommodate vehicular and pedestrian traffic from portions of the road affected by construction
- ii. Provide and maintain across-trench access to all stands and properties at all times.
- iii. Where half-width construction is approved or appropriate, arrange his work that the traffic will at all times have free one-lane access to at least half the width of the roadway
- iv. Wherever possible, where half width construction is used, ensure that the whole road is open at night and to a good and safe trafficable condition
- v. Ensure that the usable width of the road or by-passes are at least 6m for two-way traffic or at least 4m per lane for single-lane traffic
- vi. Provide measures, to the satisfaction of the Engineer, to control dust nuisance for the duration of construction, These measures may include, but is not limited to, spraying of water or placing of asphalt to the appropriate thickness

- vii. Maintain such by-passes for the duration of construction to a condition fit to safely accommodate road traffic
- viii. Demolish such by-passes on completion of construction and reinstate the area to its original condition on completion of construction.

PSA 5.11 Protection of Railway line until Construction in Vicinity is Complete(Not applicable)

The Contractor shall ensure that any railway line along the pipeline route shall be protected during construction. The Contractor is to ensure that the owner SPOORNET, Infrastructure Maintenance, P.O Box 30943, Braamfontein, 2001, OR the relevant office in Gauteng, are informed of the work to take place and to hand over the infrastructure in the same condition that they receive it.

PSA 5.12 Discontinue operations and transfer plant, equipment and labour

The construction of the Lethabo will ideally commence at Lethabo Pump Station and terminate at B 11 and B19 cross connections. Should the Contractor regard that more working fronts are required in order to complete the work on time, it should be qualified at bid stage.

When the construction operations are under way the construction train will extend from the forward site clearing and setting out activities followed the excavation of pipe trenches, the trench floor and pipe bed preparation, the pipe laying operation, by final backfilling, construction of the valve chambers and structures and the cleaning up and reinstatement of the working space.

The tendered rates should be based on continuous progress of all necessary operations taking into account plant, equipment, accommodation and labour movements at crossings of roads, streets, railways, canals, streams, watercourses, various services and a reduced rate of advance in soils which have a low shear strength and in wetland areas.

Should it become necessary to discontinue the excavations and/or pipe laying at a point along the route of the pipeline out of the sequence prescribed above and to recommence at another point the Contractor shall on the instructions of the Engineer transfer his operations, including supervision, accommodation and supply system to the new point and continue in the rearranged sequence. Items are included in the Bill of Quantities to cover transfers not foreseen and allowed for in the sequence set out above.

Note: This excludes moving where rock is encountered along the trench route.

PSA 5.13 Moving of equipment over road crossings and railway lines (not applicable)

Concrete sleeves are to be jacked under specified roads as part of this Contract. The Contractor will have to move his equipment around or over these features in order to make connections to these jacked pipe crossings. No additional payment will be made for these moves.

PSA 5.14 Continue operations in confined and reduced working space width

At the start the Phase 1 the existing Rand Water pipeline will run along the Sasol pipeline. No construction vehicle traffic or any other traffic will be allowed to travel on or closer than 5m from the centreline of these existing pipelines.

No additional loading will be allowed on these existing pipelines due to material storage, stockpiling of materials, etc.

The Contractor will limit or confine construction operations to a reduced working space as per the Engineers instruction up to a minimum of where the Sasol Pipeline is protected, as such the contractor shall include the price for a suitable sized crane to ensure it reaches all areas of the site. The Contractor shall on the instruction on the Engineer confine all his operations, to a reduced working strip away from the Sasol pipeline and continue all operations in this manner up to a point indicated by the Engineer.

PSA 8 MEASUREMENT AND PAYMENT

PSA 8.3 SCHEDULED FIXED-CHARGE

PSA 8.3.2 Establishment of Facilities on Site

PSA 8.3.2.1 Facilities for Engineer

Delete sub-items (a), (b) and (c) and substitute:

- (a) Office buildings (No, type)Unit : Sum/No
- (b) Nameboards (No)Unit : Sum/No
- (c) Car ports (No) and/or covered/open parkingUnit : Sum/No
- (d) Office communications (telephone and Wifi internet connection and all related requirements) Unit : Sum
- (e) Survey Assistants and Materials Unit : Sum

PSA 8.3.2.2 Facilities for Contractor

Add the following new items:

PSA 8.3.5 Security of Contractor's Plant and Personnel..... Unit : Sum

The tendered sum shall include full compensation for all costs incurred in effecting the safety and security of plant and personnel on site as described in Clause PSA 5.9.1.

PSA 8.3.6 Setting out of the works Unit : Sum

The tendered sum shall include full compensation for all costs incurred in setting out of the works, taking and plotting of longitudinal and cross-sections, computation of earthworks quantities and for all other obligations described in Clause PSA 5.1.1.

PSA 8.3.7 Occupational Health and Safety (fixed charges):

**(a) General safety obligations
..... Unit : Sum**

Compliance with the general health and safety obligations (as set out in the Employer's specification) will be measured and paid by the sum. The tendered sum(s) shall cover the cost not included under the scheduled work items nor under (b) to (e) below, of establishing the general health safety systems and general compliance with the Act and its construction regulations.

(b) Risk assessment

..... **Unit : Sum**

Risk assessment will be measured and paid by the sum. The tendered sum shall cover the cost of carrying out the required risk assessments at the start of the Contract and the inclusion thereof in the health and safety plan.

(c) Health and safety plan

..... **Unit : Sum**

The health and safety plan will be measured and paid by the sum. The tendered sums shall cover the Contractor's cost of the preparation, approval process, maintenance and implementation of an approved health and safety plan.

(d) Training

..... **Unit : Sum**

Training, as required by the Construction Regulations will be measured and paid by the sum. The tendered sum/s shall cover the cost of the required training.

(e) Medical assessment of employees

..... **Unit : Sum**

Medical assessment of employees will be measured and paid by the sum. The tendered sum shall cover the cost of having the Contractor's employees medically assessed with regard to their medical fitness for the work they will be required to perform and/or vehicles or plant they are required to operate and the provision of the appropriate certificate.

PSA 8.3.8 Complying with requirements of the Environmental Management Plan (EMP) (fixed charges)

(a) Signage

..... **Unit: Sum**

Signage will include a do not remove - 30mm x 30mm sign at all top soil stock piles. A sign at the entrance of the site offices must be supplied and installed indicating the following; the contractor's contact details numbers, Authorisation details, Environmental Control Officer (ECO) details, emergency numbers and provision for:-snake removal, bee removal, fire, large hydrocarbon spillages, sewerage spillages and safety officer.

The tendered Sum shall cover all fixed related costs associated with complying with the above items and shall include for all materials, labour and plant required to execute and complete the Works as specified in the EMP.

(b) Pollution prevention
..... **Unit: Sum**

Pollution prevention will cover the provision of fire protection equipment, waste bins and receptacles that comply with the waste clauses of the EMP, adequate serviced ablution facilities, designated eating and smoking areas, screening for unsightly works, water cart/s to adequately water the site a minimum of twice a day, and spillage kits for all construction vehicles and be easily available on site.

The tendered Sum shall cover all fixed related costs associated with complying with the above items and shall include for all materials, labour and plant required to execute and complete the Works as specified in the EMP.

(c) Erosion control and silt management (items to be on site all the time)
..... **Unit: Sum**

Erosion control and silt management will cover the provision of the following items; a 50m long silt fence for inside water courses and all slopes, 50 hay bales, 50 sand bags, 5 settling ponds with lining for decanting muddy water from trenches, 2 sock fitted to trench pumps at discharge end, a 100m hessian or similar type product for all slopes to erode prior to rehabilitation.

The tendered Sum shall cover all fixed related costs associated with complying with the above items and shall include for all materials, labour and plant required to execute and complete the Works as specified in the EMP.

(d) Working in sensitive areas
..... **Unit: Sum**

Working in sensitive areas will cover the following; the removal and returning of excavated material from the regulated areas of water courses as per the EMP, the provision of crain mats to access wet areas to avoid building platforms through sensitive water courses for all vehicle access and the barricading of any sensitive areas as no go with diamond mesh fencing.

The tendered Sum shall cover all fixed related costs associated with complying with the above items and shall include for all materials, labour and plant required to execute and complete the Works as specified in the EMP.

(e) Waste disposal provision
..... **Unit: Sum**

Waste disposal will cover general waste and hazardous waste.

The tendered Sum shall cover all fixed related costs associated with complying with the above items and shall include for all materials, labour and plant required to execute and complete the Works as specified in the environmental management specification.

(f) Administration and documentation

..... **Unit: Sum**

A file should be provided on site to cover administration and documentation. This file should have the following items; permits and licences (authorisations), EMP, Environmental audit reports, complaints register, agreements with landowners, non-compliance notifications, waste disposal documentation and safety data sheet for all chemicals.

The tendered Sum shall cover all fixed related costs associated with complying with the above items and shall include for all materials and labour required to execute and complete the Works as specified in the EMP.

PSA 8.4 SCHEDULED TIME-RELATED ITEMS

PSA 8.4.2 Operation and Maintenance of Facilities on Site, for Duration of Construction, except where otherwise stated:

PSA 8.4.2.1 Facilities for the Engineer

Delete sub-items (a), (b), (c) and (d) and substitute:

- (a) Office buildings (No, type)..... Unit : Sum
- (b) Nameboards (No) Unit : Sum
- (c) Car ports (No) and/or covered/open parking Unit : Sum
- (d) Office communications (telephone and Wifi internet connection and all related requirements..... Unit : Sum
- (e) Survey Assistants and Materials Unit : Sum

Add the following new items:

PSA 8.4.6 Security of Contractor's Plant and Personnel Unit : Sum

The tendered sum shall include full compensation for all costs incurred in effecting the safety and security of plant and personnel on site as described in Clause PSA 5.9.1.

PSA 8.4.7 Setting out of the works Unit : Sum

The tendered sum shall include full compensation for all costs incurred in setting out of the works, taking and plotting of longitudinal and cross-sections, computation of earthworks quantities and for all other obligations described in Clause PSA 5.1.1.

PSA 8.4.8 Occupational Health and Safety (time related charges):

(a) General safety obligations

..... **Unit : Sum**

Compliance with the general health and safety obligations (as set out in the Employer's specification) will be measured and paid by the sum. The tendered sum(s) shall cover the cost not included under the scheduled work items nor under (b) to (c) below, of maintaining, on an on-going basis, the general health safety systems and general compliance with the Act and its construction regulations.

(b) Risk assessment

..... **Unit : Sum**

Risk assessment will be measured and paid by the sum. The tendered sum shall cover the cost of carrying out (subsequent to the initial assessment) any risk assessment that is proved necessary as the work proceeds, and the inclusion thereof in the health and safety plan.

(c) Health and safety plan

..... **Unit : Sum**

The health and safety plan will be measured and paid by the sum. The tendered sums shall cover the Contractor's cost of the maintenance and implementation of an approved health and safety plan.

PSA 8.4.9 Complying with requirements of the Environmental Management Plan (EMP) (time related charges)

(a) Signage

..... **Unit: Sum**

Signage will include a do not remove - 30mm x 30mm sign at all top soil stock piles. A sign at the entrance of the site offices must be supplied and installed indicating the following; the contractor's contact details numbers, Authorisation details, Environmental Control Officer (ECO) details, emergency numbers and provision for:-snake removal, bee removal, fire, large hydrocarbon spillages, sewerage spillages and safety officer.

The tendered Sum shall cover all time related costs associated with complying with the above items and shall include for all materials, labour and plant required to execute and complete the Works as specified in the EMP.

(b) Pollution prevention

..... **Unit: Sum**

Pollution prevention will cover the provision of fire protection equipment, waste bins and receptacles that comply with the waste clauses of the EMP, adequate serviced ablution facilities, designated eating and smoking areas, screening for unsightly works, water cart/s to adequately water the site a minimum of twice a day, and spillage kits for all construction vehicles and be easily available on site.

The tendered Sum shall cover all time related costs associated with complying with the above items and shall include for all materials, labour and plant required to execute and complete the Works as specified in the EMP.

(c) Erosion control and silt management (items to be on site all the time)

..... **Unit: Sum**

Erosion control and silt management will cover the provision of the following items; a 50m long silt fence for inside water courses and all slopes, 50 hay bales, 50 sand bags, 5 settling ponds with lining for decanting muddy water from trenches, 2 sock fitted to trench pumps at discharge end, a 100m hessian or similar type product for all slopes to erode prior to rehabilitation.

The tendered Sum shall cover all time related costs associated with complying with the above items and shall include for all materials, labour and plant required to execute and complete the Works as specified in the EMP.

(d) Working in sensitive areas

..... **Unit: Sum**

Working in sensitive areas will cover the following; the removal and returning of excavated material from the regulated areas of water courses as per the EMP, the provision of crain mats to access wet areas to avoid building platforms through sensitive water courses for all vehicle access and the barricading of any sensitive areas as no go with diamond mesh fencing.

The tendered Sum shall cover all time related costs associated with complying with the above items and shall include for all materials, labour and plant required to execute and complete the Works as specified in the EMP.

(e) Waste disposal provision

..... **Unit: Sum**

Waste disposal will cover general waste and hazardous waste.

The tendered Sum shall cover all time related costs associated with complying with the above items and shall include for all materials, labour and plant required to execute and complete the Works as specified in the environmental management specification.

(f) Administration and documentation

..... **Unit: Sum**

A file should be provided on site to cover administration and documentation. This file should have the following items; permits and licences (authorisations), EMP, Environmental audit reports, complaints register, agreements with landowners, non-compliance notifications, waste disposal documentation and safety data sheet for all chemicals.

The tendered Sum shall cover all time related costs associated with complying with the above items and shall include for all materials and labour required to execute and complete the Works as specified in the EMP.

PSA 8.8.2 Accommodation and Temporary Deviation of Traffic Unit : Sum

The sum shall cover the cost to supply and operate plant and machinery, supply and place materials and other measures and cost of labour for dealing with traffic and maintenance of roads. The rate shall also include the preparation of a traffic management plan which should comply to the requirements of clause PSA 5.10. Separate payment will be made for the fixed-charge and time-related components of the cost in terms of Clause 8.2 of SANS 1200 A.

PSA 8.8.3 Protection of Railway line until Construction in Vicinity is Complete Unit : Sum

The sum shall cover the cost to supply and operate plant and machinery, supply and place materials and other measures and the cost of labour for the deviation/accommodation of traffic.

PSA 8.8.7 Dealing with Water

The sum shall cover the cost of labour, material and plant to keep the pipe trench, jacking's and excavations free from water at all times during construction.

----- Unit: Sum

PSA 8.8.8 Discontinue operations and transfer plant, equipment and labour Unit : No

The rate for unexpected discontinue operations at a point along the route of the pipeline and transfer plant, equipment and labour shall include everything necessary to close down in sequence the various operations in the construction train and transfer them in sequence to the new working plan. The price schedule includes items for one transfer over a plant and equipment route distance of up to 2km and one transfer over a route distance exceeding 2km. For purposes of classification the distance shall be measured along the shortest practical route along which the plant and equipment can be transported.

PSA 8.8.9 Moving of equipment over major road crossings and railway lines Unit : No

The rate for moving equipment around or over these features in order to make connections to the jacked pipe crossings. No additional payment will be made for these moves.

PSA 8.8.10 Protection of road surfaces Unit : Sum

The rate shall include for selecting, transporting and spreading suitable material in the 300mm thick protective layer and maintaining it while the excavation of the trench, installation of the pipe and backfilling operations are in progress. The rate shall also include the collection into piles, loading the material and the final cleaning of the road surfaces.

PSA 8.8.11 Standing Time Costs Unit : Days

The rate shall include for overheads, plant charges, wages and all other costs incurred when the Contractor is unable to carry out the work of the contract, for reasons beyond his control.

PSA 8.8.12 Temporary Access Unit : Sum

The temporary access to the working area shall include all site preparation, site clearance, earthworks, compaction, levelling, protection of the works and other works as may be required to construct the temporary track and to remove it upon completion of the works. The track shall be of such a nature as to provide safe access to all portions of the works during construction.

No additional payment shall be made for any other aspect relating to the temporary access track, whether relating to access for pipe deliveries, access during construction, access for the Engineer or the Employer or access for testing of the pipeline or any other matter.

PSA 8.9 Freehaul and Overhaul

Notwithstanding any clauses in any Standardized Specification or any Particular Specification or Standard Specification Section dealing with the definition, measurement and/or payment for transport, freehaul and/or overhaul, no measurement or payment for overhaul will be made. All haulage will be considered to be freehaul and the cost thereof will be deemed to be covered by the rates for the provision or disposal of the applicable material.

PSA 8.10 Specified Work Activity

The specific work activity identified in the Bill of Quantities, will be measured in the unit scheduled in the Bill of Quantities.

The sum or rate for such work activity:

- Shall cover the cost of all materials, labour and plant required to execute and complete the work activity as specified or described in the Bill of Quantities or as shown on the drawing(s), and/or, where appropriate, shall
- Cover the cost of all requirements and obligations with respect to the work activity as specified or described in the Bill of Quantities.

PSA 8.11 Cost of Health and Safety

The payment items for Occupational Health & Safety are contained in the Commercial Part of the Bid Document i.e. Bill of Quantities. A pro-forma BOQ is given below as a guide to the items the Contractor should allow for in his pricing.

Item	Description	Unit
Preparation of Contractor's Site Specific Health and Safety Plan	The rate for this item must cover all expenses incurred in preparing the Contractor's project specific Health and Safety Plan as required by the Client's Site specific Health and Safety Specification in this document	Lump Sum
Principal Contractor's initial obligations in respect of the Occupational Health and Safety Act and Construction Regulations	<p>The full amount will be paid in one instalment only when the Client's Agent has verified and approved the following</p> <ul style="list-style-type: none"> (a) The Principal Contractor has notified the Provincial Director of the Department of Labour in writing of the project, Annexure A to the Regulations. (b) The Principal Contractor has made the required initial Appointments of Employees and Contractors. (c) The Client has approved the Principal Contractor's project Health and Safety Plan. (d) The Principal Contractor has set up his Health and Safety File. 	Lump Sum
Principal Contractor's time related obligations in respect of the Occupational Health and Safety Act and Construction Regulations	The amount shall represent full compensation for that part of the Principal Contractor's general obligations in terms of the Occupational Health and Safety Act and Regulations which are mainly a function of time. Payment will be made when the Client's Agent has verified the Principle Contractor's compliance as part of the audit. This will include the updating and administration of the Health and Safety file	Month
Provision of Personal Protective Equipment (PPE)	<p>The rates for these items shall include for the procurement, delivery, storage, distribution and all other actions required for the supply of PPE to the employees of the Principle Contractor, full or part time, requiring them. Contractors are responsible for their on costs in this regard. Any items of PPE not included on the list will be paid for only after the Engineer has agreed to their acquisition.</p> <p>Items listed will include, among others which may be noted, are: hard hats, reflective vests, reflective bibs, high visibility overalls, protective foot wear, fall arrestor harness and tethers, gloves, ear muffs, earplugs and dust masks of appropriate type. Normal items such as standard overalls, waterproof clothing, gum boots and standard workshop safety equipment</p>	Lump Sum

Item	Description	Unit
	<p>such as welding masks and goggles will not be paid for.</p> <p>Payment will be based on the issues register for PPE as kept by the Construction Health and Safety Officer, backed up by paid invoices if requested.</p>	
Provision of full time Construction Health and Safety Officer	The Bid sum shall include for the cost of a Construction Health and Safety Officer on a full time basis, his overheads, transport and all others items necessary for the proper carrying out of his duties, which include the induction and training of all persons on site. If a part time safety officer is appointed, by agreement with the Employer, then the amount Tendered will be prorated according to the amount of time spent on the project.	Lump Sum
Costs of Medical Surveillance	<p>This item shall covers all costs in involved in the obtaining of baseline, periodic (at least annually) and exit medical certification and conducting medical surveillance for all workers and especially operators of Construction vehicles and mobile plant as contemplated in CR 21(d) (ii); Workers at Heights, Regulation 8 (2) (b) of the Construction Regulations and Workers exposed to hazardous chemicals including bituminous fumes under Regulation 7 of the HCSR; for temporary workers and workers exposed to noises at or above the limits given in the Noise-induced Hearing Loss regulations, as stipulated above.</p> <p>Workers in the permanent employ of the Contractor will only be paid for if their certificates require updating. Chest x-rays will be required in the case of workers who may be exposed to high concentrations of dust (silica).</p> <p>C.06 a) Initial (baseline) medical examinations, including audiometric and lung function testing. C.06 b) Periodic examinations C.06 c) Exit examinations</p>	Lump Sum
Induction Training	This item shall cover all costs incurred for the health and safety inductions as set out on Regulation 7 of the Construction regulations and the proof of induction required. Payment will be made on the figures contained in the induction section of the Health and Safety File.	Unit

Item	Description	Unit
Provision of First Aid Boxes including emergency safety equipment such as fire extinguishers	The rate for this item shall cover all costs incurred in the provision and maintaining of first aid boxes as well as other emergency safety equipment which includes, but will not be limited to the provision of fire extinguishers.	Unit
Transportation of Workers	The Lump sum tendered under this Item shall cover all costs involved in the safe transportation of workers as outlined above. Payment will be made in equal amounts for the duration of the contract.	Lump Sum
Welfare Facilities	Adequate toilets and hand washing facilities, clean, safe drinking water, sheltered eating facilities, showering and changing facilities for each sex	Lump Sum
Occupational Hygiene Surveys	The lump sum tendered for this item shall cover the costs of the anticipation, recognition, evaluation, control and prevention of hazards from work that may result in injury, illness, or affect the wellbeing of workers. These hazards or stressors are typically divided into the categories biological, chemical, physical, ergonomic and psychosocial.	<i>Lump Sum</i>
Training	The Lump sum tendered under this Item shall cover all costs involved in Occupational Health and Safety Training Requirements: (as required by the Construction Regulations and as indicated by the SHE Specification Document & the Risk Assessment/s and recommendations by the Health and Safety Committee.	Lump Sum
Security requirements	The Lump sum tendered under this Item shall cover all costs involved in providing a Security Guardhouse for security guards on-site with ablution facilities where appropriate, a Visitor's register and Occurrence. Two way radio or cell phone to report emergencies to the relevant authorities, site safeguarding and full security uniform worn at all times.	Lump Sum
Employee Wellness Programs	This item shall cover costs of programs implemented improve the health of the labour force, mentally, physically and socially.	Lump Sum
Submission of the Health and Safety File (hard and soft copies)	Expenditure under this item shall be made in accordance with the general conditions of contract. This amount will be paid only once the Principal Contractor has met all his obligations in respect of the Occupational Health and Safety Act and the Construction Regulations and has submitted his	Lump Sum

Item	Description	Unit
	Health and Safety File complete as envisaged on this specification to the Client's satisfaction.	

PSA 8.12 Cost of Environment

The payment items for Environmental issues are contained in the Commercial Part of the Bid Document i.e. Bill of Quantities. A pro-forma BOQ is attached to this SHE Specification as a guide to the items the Contractor should allow for in their pricing.

Item	Description	Unit
Signage	The rate for this item must cover all expenses incurred in preparing signage at the entrance of the site offices indicating the following information <ul style="list-style-type: none"> • The contractor's contact numbers • Authorisations details • ECO details • Emergency numbers and provision for: – snake removal, bee removal, fire, large hydrocarbon spillages, sewerage spillages Signage measuring 30mmx30mm must also be made available for no go areas.	Lump Sum
Pollution prevention	The rate for this item shall include costs for Identification and reduction or elimination of activities, areas, or processes which create excessive waste products or pollutants. It shall include but not be limited to the provision of adequately serviced ablution facilities, Screening for unsightly works and water cart/s for adequately watering down the site.	Lump Sum
Erosion control and silt management	The amount shall represent the costs associated with the practice of preventing or controlling wind or water erosion during construction. The erosion control measures must effectively prevent water pollution, soil loss, wildlife habitat loss and human property loss. The rate shall also include the costs of silt control where devices shall be designed to keep eroded soil on a construction site, so that it does not wash off and cause water pollution to a nearby stream, river, lake, or dam.	Lump Sum
Work in sensitive areas	The Bid sum shall include for the cost associated with the protection of areas where the natural environment can easily be harmed. Control measures will be as	Lump Sum

Item	Description	Unit
	indicated in the EMPr.	
Waste disposal provision	The Bid sum shall include for the cost for proper disposition of discarded or discharged material where it be hazardous or non-hazardous waste, in accordance with local environmental guidelines or laws.	Lump Sum
Administration and documentation	The rate for this item must cover all expenses incurred in the preparing and maintenance of an environmental file which includes but will not be limited to permits and licenses, EMPr, Environmental audit reports, Complaints register, Agreements with landowners, Noncompliance notifications, Waste disposal documentation, Safety data sheets for all chemicals	Lump Sum

PSA 8.13 Skills Development Program

The sum shall cover the Contractor’s cost to provide a skills development program that addresses the skills capacity of the workforce and also other members of the community who may not necessarily form part of the project workforce but will benefit from training program that may aid their marketability in general or as ordered by the Engineer. Accredited training program are targeted which will provide the beneficiaries with significant and recognized credit value in accordance with the National Qualification Framework (NQF). Non-accredited training program are not encouraged as the aim is to have significant, measurable and sustainable impact.

----- Unit : Prov Sum

PSA 8.14 Corporate Social Responsibility Program

The sum shall cover the Contractor’s cost to addresses a specific community need such as educational, health, economic and other social needs. It is important to carefully structure a social responsibility program that will ensure effective delivery to address the identified community needs in a significant and sustainable manner or as ordered by the Engineer.

----- Unit : Prov Sum

PSA 8.15 Community Liaison Officer

The sum shall cover the Contractor’s cost to provide a community liaison officer for the duration of the program. A key component in aiding the realization of the

SED objectives is effective community liaison with all the relevant role-players, structures, civic organizations and the community at large.

----- Unit : Prov Sum

PSA 8.16 As built

The sum shall cover the Contractor's cost of all materials, labour and plant required to execute and complete the work activity as specified under PS 13 or described in the Bill of Quantities or as shown on the drawing(s), and/or, where appropriate, shall cover the cost of all requirements and obligations with respect to the work activity

----- Unit : Sum

PSAB: ENGINEER'S OFFICE (Applicable to SABS 1200 AB – 1986)

PSAB 1 **SCOPE**

PSAB 1.1 Delete this sub-clause and substitute:

This Specification covers the requirements for offices, carports and the minimum associated facilities for the use of the Engineer on the site.

THE CONTRACTOR SHALL NOTE THAT THESE ARE GENERAL REQUIREMENTS AND THAT ONLY THOSE ITEMS THAT ARE SPECIFICALLY REQUIRED ON THIS CONTRACT ARE ITEMISED IN THE SCHEDULE OF QUANTITIES.

At the time the Contract is awarded, the Engineer shall give the Contractor full details in writing regarding the number, type and layout of all the units required, as well as details of fittings and equipment required. The Contractor shall not order any buildings, material, equipment or fittings on the basis of what is specified or scheduled without the written confirmation from the Engineer. No buildings shall be erected without the Engineer's written instructions as to the exact position or orientation of the buildings.

The offices and car ports shall, unless otherwise agreed or instructed, be erected in close proximity to the Contractor's offices and laboratory and the entire area shall be fenced with security fencing and provided with a gate. The Contractor shall take all reasonable precautions to prevent unauthorised entry to the offices and laboratories and to ensure the general security of the offices.

PSAB 2 **INTERPRETATIONS**

PSAB 2.3 **DEFINITIONS**

Add the following definitions:

Car Port: A shelter for a car, constructed on site.

PSAB 3 **MATERIALS**

PSAB 3.1 **NAME BOARDS**

Add the following:

The name board shall be of size 2,5 m x 2,5 m and the wording shall be finalised after the award of the Contract.

PSAB 3.2 OFFICE BUILDING(S)

Delete this sub-clause entirely and re-title the sub-clause "FACILITIES FOR ENGINEER".

Add the following sub-clauses:

PSAB 3.2.1 Office Buildings

The Contractor shall provide, furnish and equip one or more offices (as scheduled) for the use of the Engineer.

Buildings for offices shall be constructed of timber or other approved materials. The buildings shall have double walls filled with insulating material and lined on the inside with timber or other approved material. Ceilings shall be provided and offices shall have timber or concrete floors with edge to edge carpeting with foam-backed needle punch carpeting.

Office buildings shall be painted with an approved paint after erection and the paintwork shall be maintained during the contract period.

Each door shall be provided with a lock and two keys.

The siting of all offices shall be to the Engineer's satisfaction and shall be decided upon in consultation with him and confirmed in writing before erection. All accommodation shall include the provision of a constant 220 volt A.C. electrical supply, access roads where required, fresh clean potable water and sewerage, including septic tanks which will be considered as part and parcel of the accommodation provided and will not be paid for separately.

All accommodation shall meet with the approval of the Engineer.

The offices shall comply with the following requirements:

<u>Dimensions</u>	<u>Type 2 Office</u>
Minimum floor area	16,0m ²
Minimum window area	2,4m
Minimum window area opening	1,5m ²
Minimum clear height	2,4m

Furniture and equipment:

Each office shall be equipped with the following:

- (i) Office desk with a surface area of at least 1,5 m² with at least 3 drawers, one of which can be locked.
- (ii) General purpose steel cabinet with doors, lock and two keys with at least 1,5 m² shelf area and a volume of 0,7 m³.
- (iii) Two office chairs.
- (iv) Sufficient racks and hangers for hanging contract drawings. The hangers shall be of the "Barhold" type, with one hanger to five drawings.
- (v) Double 80 watt fluorescent light fittings complete with ballast and tubes (3 per Type 1 office, 1 per Type 2 office).
- (vi) 220/250 volt 15 amp power points (4 per Type 1 office, 2 per Type 2 office).
- (vii) One 150 ℓ refrigerator (only for one office).
- (viii) Survey equipment as listed below (only for one office):
 - 1 tacheometer capable of reading to 20 seconds of arc
 - 1 automatic Engineer's level
 - 1 5 m levelling staff (5 piece, with closed length of 1,3m max)
 - 2 tacheometer staffs
 - 1 25 m Fibreglass tape
 - 1 50 m Stilon tape
 - 6 ranging rods (sectional type with screw couplings)
 - Steel and wooden pegs and hammer as required.
- (ix) Air-conditioning unit for cooling in summer and heating in winter.

The tacheometer may be shared by arrangement between the Contractor and the Engineer, but the remaining instruments shall be provided for the exclusive use of the Engineer. The Contractor shall keep the equipment continuously insured against any loss, damage, or breakage and he shall indemnify the Engineer and Employer against any claims in this regard.

The Contractor shall also provide a toilet for the exclusive use of the Engineer and his personnel. The toilet shall be of the flush type, complete with sewer reticulation or septic/conservancy tanks. The room shall be equipped with hand wash basin complete with taps and drain and towel rail.

On completion of the Works, ownership of the buildings, furnishings and equipment shall revert to the Contractor who shall remove them from the Site.

PSAB 3.2.2 Carpports

The Contractor shall provide four carpports adjacent to the offices as directed by the Engineer.

Carpports shall be so constructed and positioned that the vehicles parked under them will at all times be protected against the direct rays of the sun. The carpports

shall be at least 20 m² in area and the floors shall consist of a layer of broken stone to alleviate dusty and muddy conditions.

The Contractor shall maintain the car ports in good condition throughout the contract period.

Upon completion of the whole of the Works, the ownership of the carports shall revert to the Contractor who shall remove them from the site.

PSAB 3.2.3 Special testing of materials

Except when specifically directed by the Engineer, the Contractor shall be responsible for the execution of all tests required for quality and compaction control, and shall provide all necessary staff and equipment to the satisfaction of the Engineer for this purpose on the site of the works. No payment will be made for tests carried out by the Contractor except for specific tests ordered by the Engineer.

Over and above the normal check tests carried out by the Engineer on site the Engineer may from time to time order the Contractor to arrange special check tests to be carried out by an approved independent laboratory. Where such testing is contemplated in advance, allowance shall be made for the cost thereof by the inclusion of a Provisional Sum.

PSAB 3.2.4 Accommodation of Engineer's staff

The Contractor shall, if called upon to do so, arrange for accommodation or for leased houses if required and available. The Contractor shall enter into the necessary contracts for the lease of such accommodation as may be required and shall not unreasonably object to the terms and conditions of such leases which shall be negotiated by the Engineer.

The cost of drawing up and entering into such leases shall be refundable if paid by the Contractor. Where such accommodation is contemplated in advance, allowance shall be made for the cost thereof by the inclusion of a Provisional Sum.

As an alternative to the leasing of housing by the Contractor, the Engineer shall have the right to take over from the Contractor the amount allowed in the contract for houses and to provide the housing himself or to pay for housing the Engineer may already have.

PSAB 4 PLANT

PSAB 4.1 TELEPHONE

Delete the wording of this sub-clause and substitute:

"The Contractor shall provide ADSL internet connection with 8 port Wi-Fi (wireless) router for the use of the Engineer's Representative and other Engineer's staff on site.

The internet connection shall provide at least 4 Mbps connection speed and include a minimum of 20 Gb (Gigabytes) of data per month.

PSAB 4.2 COMPUTER FACILITIES (NOT REQUIRED UNDER THIS CONTRACT)

The Contractor shall supply and install a personal computer at the offices of the Engineer's representative and maintain it for the duration of the Contract. Upon completion of the whole of the works, the ownership of the computer shall revert to the Contractor.

Computer System

- a) HP Pavilion dv5-1080ei laptop
- b) Intel Core 2 Duo P7350 2.0 GHz processor
- c) 2048MB RAM
- d) 250GB HDD
- e) MS Intelli Mouse and Pad
- f) DVDRW dual layer drive
- g) Onboard Sound
- h) 3G/ HSDPA/EDGE/GPRS Data card
- i) HP 1319 print copy and fax colour printer (A3)

The contractor shall, from the Department of Post and Telecommunications ("Telkom" or other suitable service provider approved by the Engineer) arrange for the installation in the office building of the Engineer's Representative for a wireless (Wi-Fi) internet connection as set out in PSAB 4.1.

PSAB 5 CONSTRUCTION

PSAB 5.1 ENGINEER'S OFFICE (SUB-CLAUSE 5.2)

Add to the Sub-Clause:

The toilet facilities provided for the sole use of the Engineer or his representative(s) shall be maintained in a hygienic and sanitary condition and shall be removed on completion of the Works. The facilities provided shall conform to the local health authority's requirements as applicable and the Contractor shall pay all sanitary fees and charges.

PSAB 5.5 **SURVEY ASSISTANTS**

Delete this Sub-clause and substitute:

- 1 "The Contractor shall make available to the Engineer on a full-time basis a cleaner/office assistant and in addition, when required, a suitably trained and approved survey assistant and labourers necessary to assist the Engineer in carrying out survey work, setting out and measurement of the works. The Contractor shall supply all pegs and concrete necessary for the setting out of the work. The wages of the cleaner/office assistant, survey assistant and labourers shall be paid by the Contractor."

PSC : SITE CLEARANCE (Applicable SANS 1200 C – 1980 as amended 1982)

PSC 5 **CONSTRUCTION**

PSC5.1 **Areas to be cleared and grubbed**

Only the approved minimum area required for the execution of the Works, including areas on which material shall be stockpiled for later reuse or on which material shall be dumped and spread, shall be cleared and grubbed.

Where excavations are required under existing concrete or bricked paved areas, the existing concrete surfacing shall be neatly cut with a suitable blade and the concrete or brick surfacing shall be carefully removed, stacked and cleaned for reuse. Where excavations take place under road surfaces, the bitumen surfaces shall be neatly cut with a suitable blade and the surfacing material removed within the limits of the excavation and discarded at the disposal site.

For pipe trenches, generally a sufficiently wide strip equal to the trench width plus the estimated allowance for trench side slopes plus the width of the stockpiled backfill, bedding and topsoil materials (Where relevant) and a 600 mm width (Which shall be maintained alongside the trench) plus the width of access to the trench, shall be cleared. The area to be cleared shall also allow for working space for a pipe laying platform, an access road, pipe storage strip and pipe storage mounds alongside the trench for pipe laying operations.

PSC 5.6 Conservation of Topsoil

Topsoil to a depth of 150mm, if available, shall be removed from the areas to be cleared and grubbed and stockpiled on approved sites for later use. Until required for later use, the stockpiles of topsoil material shall be stabilized by watering or other approved means

PSC 5.8 Demolition of structures

Add the following:

Hazardous substances such as asbestos cement shall be handled and disposed of by an accredited/certified specialist.

PSC 5.9 Clear and grub site for pipe trenches

For pipe trenches a sufficiently wide strip equal to the trench width plus the estimated allowance for trench side slopes plus the width of stockpiled backfill and a 600mm width (which shall be maintained alongside the trench) plus the width of access to the trench shall be cleared of vegetation. The width cleared shall, however, not exceed 20m. This is to include working space for a pipe laying platform, an access road, pipe storage strip and pipe storage mounds alongside the trench for pipe laying operations. Once the contract is complete all temporary work shall be cleared and the area returned to its original conditions as far as possible.

PSC 5.10 Remove and grub large trees and tree stumps of girth over 1m

As far as practical trees are to remain in position. The contractor may remove trees that prevent access or construction only with the prior approval of the Engineer.

Penalties for the unauthorised removal of trees shall be levied in accordance with the Penalty Table (see Section 5, Part G of the Commercial volume). Such penalties shall be against "SHERQ non-conformances, corrective and preventative actions not resolved within the agreed target dates" with the value of the penalty related to the value of the contract.

Any repeat non-conformances shall be penalised, with penalties levied against “Repeat SHERQ non-conformances”. A “repeat non-conformance” shall be the unauthorised removal of trees after an initial non-conformance has been issued, regardless of whether the initial non-conformance was penalised under this item.

PSC 8 MEASUREMENT AND PAYMENT

PSC 8.2 SCHEDULED ITEMS

PSC 8.2.10 Amend the description of item 8.2.10 to read:

Remove topsoil to a depth ordered by the Engineer and stockpile.

Add the following items:

PSC 8.2.11 Remove and dispose of

- (a) Asphalt surfacing..... Unit : m³
- (b) Kerbing and/or channelling (type stated) Unit : m
- (c) Structures:
 - (i) Plain concrete Unit : m³
 - (ii) Reinforced concrete Unit : m³
 - (iii) Brickwork..... Unit : m³

Measurement and payment for the various items shall be by the units as scheduled above and the rate shall cover the cost of all operations necessary for the breaking up and removal including the transporting of the material to spoil areas.

Reinforced concrete shall be defined as concrete containing not less than 0,2% steel reinforcement.

PSC 8.2.12 Removal of pipes

NOT USED

PSC 8.2.13 Dealing with Fences and Walls

The rate shall cover the cost of all activities (including obtaining the necessary negotiations and approvals from the property owners), plant, material, and labour

time to comply with the requirements for the protection and re-erection of fences.
.....Unit : m

PSC 8.2.14 Crossing Fences

When it is necessary to cross a fence/wall a 5m wide double gate is to be installed in the existing fence and 20m of fence is to be refurbished as shown on Drawing **A4085**. The rate shall cover the cost of all activities, plant, material, and labour time to comply with the drawing requirement

..... Unit: No

PSC 8.2.14/1 Fire breaks

Measurement will be in square metres over the area instructed by the Engineer.

----- Unit: Sq. m

PSC 8.2.15 Supply and erect fences and gates for working strip

It is necessary to protect the working area from public and animals. Hence, prior commencing works, 1.8m high cattle proof temporary fence shall be erected on both sides of the temporary working strip or servitude with gates. The rate shall cover the cost of all activities, plant, material, and labour to erect and dismantle the fence and gates for reuse.

-----Unit m

PSDA : EARTHWORKS (SMALL WORKS) (Applicable to SABS 1200 DA - 1990)

PSDA 5 CONSTRUCTION

PSDA 5.1.1.1 Barricading and Lighting (Refer SANS 1921-1 Clause 4.18.2 and 4.18.3)

Delete the Sub-Clause and substitute :

Without limiting any obligation which the Contractor may have in terms of any Act, Ordinance or other legislation, the Contractor shall ensure that all excavations which are accessible to the public or which is adjacent to a public road or thoroughfare, or by which the safety of persons may be endangered are protected as set out in clause 13 of the General Safety Regulations of the Occupational Health and Safety Act, 1993 and that watchmen are employed to ensure that barricades, barriers and lights are effective at all times.

Trench excavations shall be protected by means of at least two horizontal double sided 'red/white; chevron tapes approved by the Engineer. The tapes shall be stretched tightly between supports along both sides and ends of the excavation at levels approximately 0,45m and 1,12m above the ground. The supports shall consist of poles or iron standards securely planted in solid ground at not more than 10m centres so as to enclose the spoil and the excavations

Bridges for vehicles and/or pedestrians shall be provided along the route of the work as and where may be considered necessary by the Engineer. They shall consist of a number of suitably sized steel plates laid across open excavated trenches. They shall be protected on each side by a stout two rail time fence, at least 1m high, consisting of 150 x 75mm time verticals set firmly into the ground, 75mm x 50mm rails securely fastened to them. At least 4 lamps or reflective markers must be provided at each crossing.

Where construction is in, or across, public roads the barricades or barriers and temporary road signs shall be erected. All such signs and positioning thereof shall comply with the requirements set out in Road Note 13 read in conjunction with the SA Road Traffic Signs Manual.

PSDA 5.1.1.2 Safeguarding of Excavations (Refer SANS 1921-1 Clause 4.18.3)

In sub-clause a) delete the words "Machinery and Occupational Safety Act" in the third and fourth lines and substitute "regulations to the Occupational Health and Safety Act, 1993"

PSDA 5.1.1.3a) Explosives (New Sub-Clause) (Refer SANS 1921-1 Clause 4.7)

Notwithstanding Sub Clause 5.1.1.3 the Engineer shall be notified at least 24 hours beforehand of the Contractors intention to use explosives on site

It shall be incumbent on the Contractor to make himself aware of the restrictions to blasting imposed by pipelines, electric transmission or telephonic lines and other similar services. Where the presence and location of pipelines, electric transmission or telephonic lines etc., are known or are shown on the Engineer's drawing at bid stage the Contractor must make allowance in his rates and programmes for restrictions and delays which may result from restrictions imposed by the authorities.

The Contractor will be required to obtain approval from Rand Water for all blasting. Where blasting is not permitted, alternative methods, including non-explosive rock breaking, may be employed and will likewise be subject to approval by Rand Water. The Contractor will furthermore be required to obtain approval for (i) the blasting sub-contractor, (ii) the blasting plan and (iii) all proposed dates and times for blasts prior to commencing any drilling, placing of charges or blasting in general. Such approval, where granted, shall be given in writing, and where any aspect is changed by the Contractor after approval, approval must be sought anew.

PSDA 5.1.1.3b) Use of Explosives (New Sub-Clause) (Refer SANS 1921-1 Clause 4.7)

Generally, the Contractor will be permitted to use explosives for breaking up rock and hard material during excavations, for demolishing existing structures and for such other purposes where it may normally be required, subject to the following conditions:

- a) The Engineer or Inspector of Explosives shall have the power to prohibit the use of explosives in cases where in his opinion, the risk of injury or damage to persons, property or adjoining structures is too high. Such action by the Engineer shall not entitle the Contractor to any additional payment for having to resort to other less economical methods of construction unless otherwise provided in the Contract Data or Bill of Quantities.
- b) Should blasting be necessary, the Contractor shall take every precaution to protect the Works and persons, animals and property in the vicinity of the site. The Contractor will be held responsible for any injury or damage caused by any blasting operations and shall make good such damage at his own expense.
- c) The requirements for the Explosives Regulations Act (Act 26 of 1956) and the requirements of the Inspector of Explosives shall be complied with. In addition, where applicable, the requirements of Chapter 9 of the Regulations published in terms of the Mines and Works Act (Act 27 of 1956) and the requirements of the Government Mining Engineer shall be complied with.
- d) A copy of each blasting permit issued to workmen, and of each permit issued to the Contractor to cover the purchase, storage and transport of explosives, shall be handed to the Engineer. The Contractor shall grant the Engineer access to all records

maintained for the Inspector of Explosives or the Government Mining Engineer, as the case may be.

- e) Before any blasting is undertaken, the Contractor, together with the Engineer shall examine and measure up any buildings, houses or structures in the vicinity of the proposed blasting and establish and record together with the owners thereof the extent of cracking or damage that may exist before commencement of blasting operations. It is advised that a photographic record will be required of neighboring structures before blasting commences. These structures will be pointed out by the Engineer. It shall be the responsibility of the Contractor to make good at his own expense any further damage to such houses, buildings or structures which is a result of the blasting.
- f) Where there is reasonable danger of damage to power and telephone lines or any other property, the Contractor shall suitably adapt his methods of blasting, the size of the charges and use adequate protective measures such as cover blasting in order to limit the risk of damage as far as possible.
- g) When blasting to specified profiles, the Contractor shall so arrange the holes and charges that the resulting exposed surfaces are as sound as the nature of the material permits. The Contractor shall make good at his own expense any additional excavation necessitated by the shattering of rock in excess of any over break allowance specified in the Specification Data or in any other specification or given on a drawing.

PSDA 5.1.1.3c) Limitations for Blasting (New Sub-Clause)

- a) *Approval of methods and keeping of records*

No blasting work may be carried out prior to the Engineer's approval being given in writing.

Prior to starting any drilling for the first section of blasting, the Contractor shall submit for approval to the Engineer, details of the proposed overall methods of blasting that will be used on site, including spacing, depth and pattern of holes, charging levels (kg/m^3), spacing and positioning of relays, method of blast initiation, precautions to prevent 'fly rock', maximum charge per relay, traffic arrangements during blasting, and any other details he may consider relevant. These details shall be submitted in writing and supported with sketches at least 7 days before the commencement of drilling and blasting.

The Engineer will evaluate these details in relation to the given limitations and prior to giving his approval, will indicate to the Contractor any changes that may possibly be needed to comply with the limitations.

For all subsequent blasts, the Contractor shall, at least 24 hours beforehand, notify the Engineer of the intention to blast and at the same time shall note if any changes will be made relative to the approved method.

The Engineer reserves the right to order the Contractor to modify his method of drilling and blasting, or to employ reduced blasting, without thereby invalidating the Contract. The Contractor shall have no claim for extra payment, over and above his tendered rates, due to his being ordered to use such a different method of drilling or blasting or reduced charges, regardless of any prior approval by the Engineer of any previous method.

After every blast, the Contractor shall, within 24 hours, submit to the Engineer details of the actual total mass of explosives used, the approximate volume of material loosened and the maximum simultaneous mass of explosives detonated (maximum charge per relay).

Notwithstanding any approval given by the Engineer, the Contractor shall at all times be responsible for the safety of the Works, persons, animals and property in the vicinity of the Site during blasting operations.

b) *Vibrations*

Blasting vibrations are caused by the transmission of the shock wave from the explosion charge through the material being blasted. This shock wave could cause damage to structures in the vicinity of the blasting if the vibrations are not limited to acceptable levels. Damage to structures is closely associated with peak particle velocity of the ground vibrations in the vicinity of the structure. Advisable maximum levels for peak particle velocity are given in Table 2.

Table 2 ; MAXIMUM PARTICLE VELOCITIES (VIBRATION)

Maximum peak particle velocity (mm/s)	Effect on people and buildings
0,5	Threshold of human perception unlikely to cause damage of any type
5	Limit for blasting adjacent to historical monuments
25	Limit for blasting near private dwellings in order to reduce disturbance to residents to a minimum
50	Limit for blasting adjacent to residential structures on good foundations
84	Limit for property owned by concern doing the blasting (ie. minor plaster cracks acceptable)
120	Recommended maximum level for blasting adjacent to sturdy reinforced concrete structures

The peak particle velocity V is related to the distance D from the blast and the maximum mass of explosive E instantaneously detonated (maximum charge per relay) by the general equation:

$$V = \left(\frac{k}{D} \right)^m x E^n$$

where k , m and n are constants for a particular set of circumstances. V is in mm/s, D is in metres and E is in kilograms. Experimentation has shown that $n = 0,5$ but k and m have to be determined for each site by means of vibration measurements. However blasting can be safely conducted without vibration measurements or expert advice if the following relationship is used:

$$V = \left(\frac{1150}{D} \right) x E^{0.5}$$

which gives the maximum charge levels for $V = 50$ mm/s listed in Table 3

Table 3 : MAXIMUM CHARGE LEVELS

Minimum distance from nearest blast hole structure (m)	Maximum charge mass per relay (kg)
10	0,19
20	0,76
30	1,7
40	3,0
50	4,7
60	6,8
70	9,3
80	12,1
90	15,3
100	18,9

Only detonating relays of at least 20 milliseconds delay interval must be used.

The above relationship can be used to calculate charge mass for other velocity limits. However, if higher charge levels have to be used for practical reasons, expert advice and possibly vibration measurements will be required.

Notwithstanding the above blasting limits, the Contractor shall at all times be responsible for the safety of the Works, person, animals and property in the vicinity of the Site during blasting operations.

PSDA 5.1.1.3d) Negligence (New Sub-Clause)

The Contractor shall be liable for all damages to services caused as a result of the Contractor's negligence.

PSDA 5.1.3 Existing Services (Refer SANS 1921-1 Clause 4.17)

Add to the Sub-Clause:

All existing services on the site may not be shown on the Drawings or be visible on the site. The Engineer may order excavation by hand in order to search for and expose services. An item has been included in the Bill of Quantities to cover the cost of such work if so ordered by the Engineer.

Where a service is damaged because of the Contractor's negligence, he shall be liable for the costs involved in the repair of the service and any other costs consequent upon the interruption of the damaged services.

PSDA 8 MEASUREMENT AND PAYMENT

PSDA 8.3.1(b) Excavation

Drawing DA-1 in the third line to read “Fig DA-1”

Delete the third line of the second sentence and substitute :

“-ation, offloading to stockpile, stockpiling and reloading as may be necessary, spreading or backfilling, compacting and watering”

PSDA 8.3.1(c) Excavation

“Drawing DA-1” in the last line to read “Fig DA-1”

PSDA 8.3.2(a) Restricted Excavation

Drawing DA-2 in the fourth line to read “Fig DA-2”

PSDA 8.3.9 Survey of Surrounding Structures before Blasting (New Sub-Clause)

The rate shall cover the cost to examine and measure up any buildings, houses or structures in the vicinity of the proposed blasting and establish and record together with the owners thereof the extent of cracking or damage that may exist before commencement of blasting operations. Unit : Sum

PSDA 8.3.10 Photographic Record (New Sub-Clause)

The rate shall cover the cost of providing a photographic record of neighbouring structures before blasting commences. Unit : Sum

PSDB: EARTHWORKS (PIPE TRENCHES) (Applicable to SANS 1200 DB – 1989)

PSDB 1 **SCOPE**

Add the following to this Clause:

The provisions of this specification shall apply mutatis mutandis to portal and rectangular precast concrete culverts.

PSDB 3 **MATERIALS**

PSDB 3.1 **CLASSES OF EXCAVATION**

Add the following to this sub-clause:

Notwithstanding the provisions of Sub-Clause 3.1, the materials excavated other than hard rock will not be classified for purposes of measurement and payment. The unit rate for excavation shall cover excavation in all materials other than hard rock and where scheduled separately boulders classes A and B (as specified in SANS 1200DA sub-clauses 3.1.2d and 3.1.2e).

PSDB 3.5 **BACKFILL MATERIALS**

In paragraph (a) insert "and (c)" after "(b)" in the first line.

Renumber paragraph (b) as "(c)" and insert the following new paragraph (b):

- (b) In the particular area subject to road traffic which lies between lines 2,0m beyond edge of roadway and 1,0m beyond back of kerb for barrier kerbs, hereinafter referred to as "areas under roadways", the material used for backfill shall be one of the following:
 - (i) A sub-base quality material conforming to the requirements of SANS 1200ME compacted in 150mm layers to 93% Mod. AASHTO density.
 - (ii) An approved selected granular material compacted in 150mm layers to 93% Mod. AASHTO density.

Amend paragraph (c) by the insertion after the word "traffic" of the words "other than under roadways". Add "The materials specified herein shall be used for backfill under paved sidewalks and in other areas ordered by the Engineer."

Under roadways and at depths exceeding 3 metres the maximum trench width below the crown of the pipe shall not exceed the minimum specified by more than 20%. Should these widths be exceeded the Contractor shall at his own cost

provide a higher class bedding than that called for to give the equivalent structural strength and where this is not practicable take such other measures to the approval of the Engineer as are necessary to attain this result.

PSDB 5 CONSTRUCTION

PSDB 5.1 PRECAUTIONS

PSDB 5.1.2 Stormwater, Seepage and Dewatering of Excavations

PSDB 5.1.2.2 Special Water Hazards

Add the following:

No specific items will be scheduled for special water hazards; the Contractor shall include for dealing with all water in his tendered rates for earthworks.

Add the following sub-clause:

PSDB 5.1.5 Maximum length of open trench:

The Contractor shall plan his operations in such a manner that the length of trench excavation remaining open shall be restricted to the absolute minimum. No excavation for prefabricated culverts may be commenced until the pipes or culverts to be installed are on site, and the excavations shall be backfilled within seven days of the pipes or culverts being installed. Unless otherwise permitted by the Engineer in writing the total length of open trench shall not exceed three hundred (300) metres. Regardless of any approval or permission granted by the Engineer, the Contractor shall comply with any restrictions on length of trench contained in his insurance policy. All manholes, catchpits, kerb inlets, etc., shall be completed and backfilled at the same time as the installation of the prefabricated culverts.

PSDB 5.5 TRENCH BOTTOM

Extend the sub-clause to include the following:

- (a) On completion of excavation, before the bottom is trimmed or bedding is placed, the bottom of the trench in suitable material shall be so compacted that the density of the upper 100mm thick layer of material is 90% of modified AASHTO density.
- (b) Should the nature of the material be such that the specified density cannot be achieved the bottom of the trench shall be over-excavated, the bottom of the over-excavation compacted, and the excavated material replaced and compacted; the depths of over-excavation, which shall be

agreed with the Engineer, shall be such that the specified density is attained at the bottom of the trench.

- (c) Where, in the opinion of the Engineer, the trench bottom is unacceptably wet or unstable due to the presence of ground water (but not due to negligence on the part of the Contractor) the Engineer will order the Contractor to over-excavate the trench and refill with 19mm stone complying with the relevant requirements of SANS 1083.

PSDB 5.6 BACKFILLING

PSDB 5.6.3 Disposal of soft excavated material

Surplus and unsuitable material shall be disposed of in designated spoil areas or utilised as fill along the canal sides, as directed by the Engineer.

PSDB 5.6.8 Transport for earthworks for pipe trenches.

Add the following:

Where labour-intensive construction methods are specified the provisions of Clauses PSA 8.9 shall be applicable.

PSDB 5.11 Shoring

The contractor shall have shoring materials on site at all times for additional shoring as being ordered by the Engineer. Shoring shall be installed and maintained in the positions and for the duration as approved by the Engineer.

PSDB 5.12 Soft Materials and Rock

The material is classified in the price schedules under 2 headings, i.e. soft material and rock and the following shall be determining factors in the classification of the material:

Soft Material : shall mean all material not classified below, and shall include all material that is pickable and can be excavated by machinery of appropriate capacity and power for the rate of excavation required, including hard clay, oukclip, calcareous material and soft rock that has not been consolidated into a hard un-pickable mass, and closely to medium jointed andesites.

Rock : shall mean all rock that is partially jointed or un-weathered and shall include oxidized hard shale, hard fireclay, hard coal conglomerate, hard homogenous oukclip, granite, quarts, dolomite, etc and blasting. Solid boulders in excess of 0.5m³ (one half of a cubic meter shall be classified as rock).

PSDB 7 TESTING

PSDB 7.1 Insert "and trench bottom" after "backfilling" in the first line.

Insert "5.5 and" before "5.7" in the fourth line.

PSDB 8 MEASUREMENT AND PAYMENT

PSDB 8.1 BASIC PRINCIPLES

Add the following:

Measurement and payment shall distinguish between items that are to be carried out using conventional construction methods and items that are to be carried out using labour-intensive construction methods.

PSDB 8.3 SCHEDULED ITEMS

PSDB 8.3.2 .b 1) Extra-over item (a) above for 1) Intermediate excavation.

No intermediate excavation will be classified.

PSDB 8.3.2 .b 2) Extra-over item (a) above for 2) Hard rock excavation.

Hard rock excavation shall be classified as per SABS 1200 D 3.1.2 c. The decision of the Engineer as to the classification of the material shall be final and binding and any objection to the classification shall be made before the trench is backfilled. The quantities listed in the schedule of quantities are purely provisional and payment will be made on the actual volume of each class of material as determined after the trench has been opened. Unit : m³

PSDB 8.3.3.1.d Make up deficiency in backfill material – sieve from excavated material

The Engineer may instruct the contractor to sieve excavated material to make it suitable for backfill or bedding..... Unit : m³

PSDB 8.3.3 Excavation ancillaries

PSDB 8.3.3.3 Compaction in Road Reserves

Delete the heading and substitute:

Compaction in areas subject to road traffic

- (a) under roadways to 93% MOD AASHTO Unit : m³
- (b) elsewhere 93% MOD AASHTO Unit : m³

PSDB 8.3.3.4 Overhaul.

No overhaul will be paid. Material will be sourced from the pipeline excavation if it is suitable. Should it be required, the material will be sieved as per PSDB 8.3.3.1 (d) or else it will be sourced from commercial sources and the cost shall include for all transport.

PSDB 8.3.5(b) Services that adjoin a trench: Overhead Power Cables

The rate shall cover the cost of all measures to be taken in order to comply with all requirements of the relevant authorities to protect the service from damages, to ensure the stability of the poles and cables and to ensure the safety of the labourers, the public or any other person for the duration of construction.

-----Unit: m

PSDB 8.3.5(b) Services that adjoin a trench: Overhead Telephone Cables

The rate shall cover the cost of all measures to be taken in order to comply with all requirements of the relevant authorities to protect the service from damages, to ensure the stability of the poles and cables and to ensure the safety of the labourers, the public or any other person for the duration of construction.

-----Unit: m

PSDB 8.3.5(b) Services that adjoin a trench: Underground Telephone Cables

The rate shall cover the cost of all measures to be taken in order to comply with all requirements of the relevant authorities to protect the service from damages, and to ensure the safety of the labourers, the public or any other person for the duration of construction.

-----Unit: m

PSDB 8.3.6.2 Topsoiling.

Add the following clause. The rate shall cover the cost of excavating from stockpiles referred to 8.3.1(c) hauling and spreading in terms of SABS 1200DA 5.2 to a compacted depth of 300mm..... Unit : m²

PSDB 8.3.8 Excavate by hand.

The rate shall cover the cost of labour for hand excavation to expose all services in soft material. Measurement will be in cubic metres to the length and levels as instructed by the Engineer..... Unit : m³

PSDB 8.3.9 Backfill with soil cement fill.

The rate shall be for the supply of cement, mixing, placing and compaction of the material. The soil shall be selected from the trench excavation. The OPC cement content shall be 5% by mass. Measurement will be in cubic metres to the length and levels instructed by the Engineer or as detailed on drawing 12647. Unit : m³

PSDB 8.3.10 Backfill the trench and other excavations with crusher run material.

The rate shall include for the supply, placing material provided at the trench side. Including provision and placing of Bidim U44 geotechnical blanket. Measurement will be in cubic metres to the length and levels instructed by the Engineer or as detailed on drawing 12647. Unit : m³

PSDB 8.3.11 Excavate and remove existing pipes, backfill and compact (Dispose at suitable hazardous landfill)

- (a) Excavation in all material to completely remove existing 50 mm dia steel pipes
 - (i) For total excavation depth not exceeding 1,0 m including fox holes for flanged jointsUnit: m

The rate shall be for the excavation in all materials and removal of the existing pipe. The excavation shall be excavated by a combination of mechanical and manual means that will avoid damage to the pipe.

PSDB 8.3.12 Placing of geotextile filter blanket

The rate shall include for the supply and placing of the geotextile as specified in the Bill of Quantities or indicated on the Drawings. The rate shall include for losses as a result of overlaps (200 mm minimum) and over-excavated trench widths. Measurement will be in square metres.

-----Unit: m²

PSDB 8.3.13 Excavate to expose existing steel pipes, backfill and compact

- (a) Excavation in all material to completely expose existing steel pipe in preparation for cross connection installation and inline valve installation:
 - (i) For total excavation depth not exceeding 1,0m

Unit: m
 - (ii) For total excavation depth exceeding 1,0m but not exceeding 2,0m

Unit: m

The rate shall be for excavation in all materials to expose the existing pipe for cross connection installation and inline valve installation. The excavation shall be excavated by a combination of mechanical and manual means that will avoid damage to the pipe

PSDB 8.3.14 Testing

Provisional sum for additional geotechnical investigations (including analysis of bedding, compatibility tests, etc) by nominated specialists, where ordered by the Engineer.

----- Prov. Sum:

PSDB 8.3.15 Kerbing

Provisional sum for reinstatement of kerbing as ordered by Engineer

----- Prov. Sum:

PSDB 8.3.16 Reinstatement of surfaces

Provisional sum for reinstatement of surfaces as ordered by Engineer

----- Prov. Sum:

PSDB 8.3.17 Trial blasts

The rate shall cover all requirements for planning, obtaining permissions/authorisations, preparation and submission of method statements, providing materials and staff, preparation of the blast area and execution of a trial blast or blasts in preparation for (or as trial for) blasting for pipe trench excavations.

----- Unit: Sum

PSDB 8.3.18 Control Blasting

The rate shall cover all requirements for planning, obtaining permissions/ authorizations, preparation and submission of method statements, providing plant, material and staff, in preparation of the blast area and execution of controlled blast / non-explosive blast or rock breaking for pipe trench excavations

-----Unit : m³

CONCRETE (SMALL WORKS) – SANS 1200 GA

GA 3 MATERIALS

GA 3.2 CEMENT

GA 3.2.1 Applicable Specifications

The standard cement specifications SANS 471, SANS 626, SANS 831 and SANS 1466 have been withdrawn and are replaced by the new SANS ENV 197-1 and -2: Common cements, and SANS ENV 413-1 and -2: Masonry cement. These specifications will be applicable to this contract, and the descriptions and types of cements specified, will be based on the designations as defined in these specifications.

GA 3.2.2 Storage of cement

ADD THE FOLLOWING:

“Cement shall not be kept in storage for longer than 10 weeks.”

GA 3.4 AGGREGATES

ADD THE FOLLOWING TO THIS SUBCLAUSE:

GA 3.4.1 Applicable Specifications

“The aggregates shall comply with the requirements of SANS 1083.

Aggregates to be used in this contract shall be tested to determine whether they are potentially alkali-reactive. If they are alkali-reactive, they shall be replaced with aggregates that are non-reactive.

The content of chloride ion in the aggregates shall be determined and shall be within the limits specified in SANS 1083. Test results in this regard shall be submitted to the Engineer.

At bid stage the Contractor shall assure himself by means of tests and test mixes by an accredited laboratory that the fine and coarse aggregates that he intends to use comply with the specification. The tendered rates shall therefore be deemed to allow for the importation of aggregates, if necessary, that do comply with the Specification.

The Contractor will be responsible for locating the sources of all aggregates.”

GA 3.4.2 **Use of Plums**

DELETE THIS ITEM, as the use of Plums will not be permitted.

GA 3.4.3 **Storage of aggregates**

ADD THE FOLLOWING TO SUBCLAUSE 3.4.3:

“It is advisable that all aggregate stockpiles be shaded from the sun by means of 80% shade netting.”

The Contractor shall ensure adequate drainage of the coarse aggregate stockpile.”

ADD THE FOLLOWING SUBCLAUSE:

“GA 3.8 **ADMIXTURES**

ADD THE FOLLOWING TO SUBCLAUSE 3.5:

“Air-entraining Agents

Air-entraining agents shall not be used.”

“Cementitious crystalline concrete waterproofing (New clause)

Xypex Admix C-500NF shall be added to all structural concrete at a dosage of 4 kg/m³. Technical assistance, which is provided free of charge by the manufacturer, shall be utilised by the Contractor.”

GA 4 **PLANT**

GA 4.4 **FORMWORK**

GA 4.4.1 **Design**

ADD THE FOLLOWING:

“Formwork for all classes of finish shall be made of steel panels. Small approved laminated wooden board inserts to steel framed panels may only be used in confined places and the use thereof will be subject to approval by the Engineer. The panels shall be free from rust, ridges, fins, bulges, imperfections, irregularities, chips and holes. The concrete surface shall be smooth and free from irregularities, bulges, ridges, imperfections, air bubbles, honeycomb or

surface discolorations. Grout checks shall be used at all construction joints and chamfers at all corners.

Joints between panels shall be sealed tightly to prevent local honeycombing or leaching of concrete. Joints between panels shall form straight horizontal and vertical lines which shall be spaced evenly on the formed concrete surface, and shall be even and smooth and require minimal or no finishing. The layout of all formwork panels and construction joints shall be discussed with the Engineer before application and shall be approved in writing prior to erection of formwork.”

GA 4.4.2 **Finish**

REPLACE THIS CLAUSE WITH THE FOLLOWING:

“Unless otherwise noted, formwork for in situ concrete shall be in accordance with the following classifications:

rough - where not exposed or is to be plastered

smooth - where exposed”

GA 5 **CONSTRUCTION**

GA 5.1 **REINFORCEMENT**

GA 5.1.3 **Cover**

ADD TO SUBCLAUSE 5.1.3:

“Concrete cover requirements to be as per the minimum prescripts of SANS 10100-2”

“The cover blocks for water-retaining structures shall be manufactured from concrete of grade, durability, density and impermeability at least equal to that specified for the respective elements except that 12 mm stone instead of 19 mm stone shall be used. The size of the cover blocks shall be 60 mm x 60 mm, with a thickness equal to the specified cover. Wires shall be cast into the blocks to enable them to be fixed to the reinforcement. The wires shall be fully galvanised Class A as per SANS 675 - 1997. The wires shall be carefully held in position while the concrete is setting to ensure that all the wires are inserted to a uniform and consistent depth of 50 % of the thickness of the cover block for all the cover blocks. The concrete shall be thoroughly compacted by means of a vibrator or vibratory table and the blocks shall be protected against early drying and shrinkage due to sun and wind, by being kept continually wet while still in the mould. After the blocks have been removed from the mould they shall be kept in

water continuously until being used, and this period shall not be less than 14 days.

A proper mix design for concrete in cover blocks shall be submitted to the Engineer for approval.

Tying wire shall not encroach on the specified minimum cover by more than a single strand thickness.”

ADD THE FOLLOWING SUBCLAUSE:

“GA 5.1.4 Splicing

Splice lengths of reinforcement for water-retaining structures shall not be less than 60 diameters and in non-water-retaining structures not less than 50 diameters. Where applicable in water-retaining structures, splices shall be staggered so that they are evenly spread throughout the structure.”

GA 5.2 FORMWORK

GA 5.2.1 Classification of Finishes

ADD THE FOLLOWING SUBCLAUSE 5.2.1:

(i) Finish on blinding layers underneath floor slabs

Where a leakage detection and drainage system is specified the blinding layer to be provided shall have a wood-floated finish. The no-fines layer to be placed on the blinding layer shall have a wood-floated finish, and the cement/sand screed on top of the no-fines concrete layer shall have a steel-floated finish.

(ii) Top of wall footings and floor slabs

The top of the wall footings and the floor slabs shall have a steel-floated or power-floated finish.

(iii) Top of walkways

The top of walkways shall have a wood-floated finish.

(iv) Top of walls

The top of walls shall have a steel-floated finish except where they form part of walkways, in which case they shall have a wood-floated finish.

(v) Visible corners

All visible corners shall have a 20 mm x 20 mm chamfer.”

GA 5.4 **CONCRETE**

GA 5.4.1 **Quality**

GA 5.4.1.4 **Prescribed Mix Concrete**

DELETE SUBCLAUSE 5.4.1.4.

ADD THE FOLLOWING SUBCLAUSE:

“GA 5.4.1.5 **Durability**

“The exposure condition for concrete shall be assumed severe. The maximum ratio of water to cementitious material shall be 0,5.”

GA 5.4.2 **Batching**

GA 5.5.2.2 **Water**

ADD THE FOLLOWING:

“The accuracy of the measurement of water shall be within 2% of the quantity required.”

GA 5.5.2.3 **Aggregate**

THIS SUBCLAUSE IS AMENDED TO INCLUDE:

“Volume batching will not be permitted. Batching by mass shall be within an accuracy of 5% of the mass required.”

GA 5.4.3 **Mixing**

ADD THE FOLLOWING TO SUBCLAUSE 5.4.3 (f):

“The use of ready-mixed concrete for this contract shall be permitted provided that it complies with the requirements of this specification. Test results obtained by such a production facility shall not be regarded as part of the quality control system, and the Contractor shall take his own samples of concrete on site and have them tested in accordance with clause 7 of SANS 1200 G, Clause G-7.1.2. as well as the Civil Technical Specification”

GA 5.4.5 **Placing**

ADD THE FOLLOWING TO SUBCLAUSE 5.4.5.1:

“The Contractor shall give the Engineer at least 48 hours’ notice of his intention to cast concrete unless stated otherwise in the Contract.”

REPLACE THE CONTENTS OF 5.4.5.3 WITH THE FOLLOWING:

“Concrete for structures shall not be allowed to fall freely through a height of more than 2,4 m. This implies that walls/columns in these structures may not be cast in lifts of more than 2,4 m in height.”

ADD THE FOLLOWING SUBCLAUSE 5.4.5.5:

“**GA 5.4.5.5** The pumping of concrete will be permitted.

GA 5.4.7 **Curing and Protection**

SUBCLAUSE G5.4.. SHALL BE AMENDED TO INCLUDE THE FOLLOWING:

“(d) Irrigation type mist spraying system

The irrigation type mist spraying system shall be controlled by an automatic timer with the capacity to activate the system for any chosen time period at any chosen time intervals, such that curing will be continuous over week-ends, public holidays and builders’ holidays. Sprayers shall be spaced at such intervals as to ensure that the whole area of concrete is wetted. The design of the system shall be submitted to the Engineer for his perusal. Should the existing water pressure on site be insufficient, a pump should be installed to operate the mist spraying system. The Contractor shall allow therefore in his tendered rates and prices.

(e) Plastic sheets and tubes

Plastic sheets and tubes used for curing shall be waterproof and may not be torn or be otherwise discontinuous. It shall be white or light-coloured. Black or other dark coloured plastic sheets will not be allowed under any circumstances. Sheets and tubes shall be held down or fixed securely to the elements being cured and joints in sheets shall be taped to prevent loss of moisture from the concrete. Care shall be exercised to prevent staining of exposed concrete.

(f) Determination of intervals and duration of application of water

The duration of water application and the intervals of application will be determined on site by the Engineer, and shall be such as to prevent the concrete from drying out. The duration and intervals shall be adjusted to allow for adverse conditions such as high temperatures and/or dry, windy conditions.

(g) Duration of curing

The curing period shall be at least 10 days.

(h) General

Notwithstanding the preceding specifications, the Contractor shall also ensure that the concrete shall not be exposed to thermal shocks during the first 28 days after casting and he shall take the necessary, additional precautionary measures to shield the concrete with plastic sheets or hessian during extreme warm, cold, dry or windy weather conditions. Hessian shall be wetted should the conditions necessitate this.

Curing shall be done in such a manner as not to cause staining, contamination or marring of the surface of the concrete.

The Contractor shall take the necessary precautions to prevent water used for curing from penetrating the soil underneath or adjacent to the structures. The water shall be drained away effectively as soon as possible to prevent any ponding.

(i) Curing Compounds

Curing compounds will not be an acceptable method of curing for water retaining structures. For other general concrete, curing compounds shall comply with ASTM-C309-74. The surfaces on which they may be used and the types and brands applied shall be approved by the Engineer.

In general, curing compounds shall be Class B/Type 2 (i.e. Resin based and white pigmented). However, where surface staining is not acceptable Class B/Type 1-D curing compounds (i.e. resin based and clear with fugitive dye) may be used, but only after approval of a test panel of the applied compound.

Under no circumstances will curing compounds be approved for use on concrete surfaces which are to receive finishes.”

GA 5.4.8 Concrete Surfaces

ADD THE FOLLOWING TO SUBCLAUSE 5.4.8.2:

“Wood-floated surfaces shall first be given a finish as specified in Sub-clause 5.4.8.1 of SANS 1200 GA and, after the concrete has hardened sufficiently, the screeded surface shall be wood-floated, either by hand or machine, only sufficiently to produce a uniform surface free from screed marks.”

“Steel-floated surface shall be treated as specified for a wood float finish except that, when the moisture film has disappeared and the concrete has hardened sufficiently to prevent laitance from being worked to the surface, the screeded surface shall be steel-trowelled under firm pressure to produce a dense, smooth, uniform surface free from trowel marks.”

“Power-floated surfaces shall be treated as specified for a wood float finish, except that the screeded surface shall be power-floated to produce a high quality dense, smooth, uniform surface free from trowel marks.”

GA 5.4.9 Watertight Concrete

ADD THE FOLLOWING:

“Watertight concrete is to be constructed in accordance with the recommendations of BS 8007.

All water-retaining structures built under this contract shall be watertight without the addition of supplementary cement plaster, coatings or membranes. Ensuring water-tightness is the exclusive responsibility of the Contractor and he shall take all the measures necessary to achieve this. All remedial work that has to be undertaken to ensure water tightness shall be for the Contractor's own account. Refer also to the relevant payment clause in this regard.”

“For testing of liquid retention, the chamber should be cleaned and initially filled to the normal maximum level with the specified liquid (water) at a uniform rate of not greater than 2m (two meters) in 24 hours.

When first filled, the liquid level should be maintained by the addition of further liquid for a stabilizing period while absorption and autogenous healing take place. The stabilizing period must be 21 days for the for the valve chamber design crack width of 0.2mm. After the stabilizing period the level of the liquid surface should be recorded at 24 hour intervals for a test period of 7 days. During the 7-day test period the total permissible drop in level, after allowing for evaporation and rainfall, should not exceed 1/500th of the average water depth of the full tank or 10mm.

Notwithstanding the satisfactory completion of the test, any evidence of seepage of the liquid to the outside faces of the valve chamber walls should be assessed against the requirements of the specification. Any necessary remedial treatment of

the concrete, cracks, or joints should, where practical, be carried out from the liquid face.

Should the structure not satisfy the 7-day test, then after the completion of the remedial work it should be refilled and left for a further stabilizing period; a further test of 7days' duration should then be undertaken in accordance with this clause”

GA 5.4.10 **Defects**

ADD THE FOLLOWING TO SUBCLAUSE 5.5.14.1:

“All repair materials shall be equivalent to concrete in respect of thermal properties and structural elasticity. Such repairs will only be allowed after the defects were inspected by the Engineer and his written approval has been obtained.”

ADD THE FOLLOWING TO SUBCLAUSES:

“G 5.4.11 **Construction Joints**

The method adopted for forming joints not covered by 5.5.7.1 and unforeseen joints, as specified in clause 2.4.3 of SANS 1200G for non-water-retaining structures, shall be one of sub clauses (a) to (d).

GA 5.5.12 **Adverse weather conditions**

The temperature of the concrete when deposited shall not be allowed to exceed 25 °C.

GA 5.5.13 **Grouting**

Grouting to underpinning and under structural steelwork and bearing plates is to be carried out in 1:2 cement: sand (sand to be graded and selected to approval) mortar and mixed as dry as possible, sufficient water being added to make the mortar only damp. The grout is to attain a minimum compressive stress of 14 MPa within seven days of mixing and at least the strength of the connecting concrete at 28 days.

Alternatively an approved proprietary brand of non-shrink grout used strictly in accordance with the manufacturer’s instructions may be used.

All grouting must be well tamped to provide a solid and homogeneous bed or packing.

Grouting may only be commenced when all work has been thoroughly cleaned and is free of all dust, mortar, etc. In the case of all bearing plates or structural steelwork, the structure must be properly levelled to approval before grouting is undertaken.

GA 7 TESTS

GA 7.1 FACILITIES AND FREQUENCY OF TESTING

GA 7.1.2 Frequency of sampling

ADD THE FOLLOWING TO SUBCLAUSE 7.1.2.1:

“The sets of samples shall be taken in accordance with SANS 5861 as close as is practicable to the start of placing and at appropriate intervals after that, or from one particular batch and then from subsequent batches chosen at appropriate intervals.”

GA 7.2 TESTING

GA 7.2.1 General

ADD THE FOLLOWING:

“The Contractor shall allow in his tendered rates for all the costs for quality or process control testing.”

GA 7.2.3 Early-strengths Testing

ADD THE FOLLOWING:

“Of each sample of three cubes, one cube shall be tested at seven days and the remaining two cubes at 28 days, unless instructed otherwise by the Engineer.”

GA 8 MEASUREMENT AND PAYMENT

GA 8.1 MEASUREMENT AND RATES

GA 8.1.2 Reinforcement

REPLACE THE FIRST PARAGRAPH OF SUBCLAUSE 8.1.2.2 WITH THE FOLLOWING:

"The mass of steel bars will be measured as the total mass of steel irrespective of diameter"

DELETE THE WORDS "...of nominal size 25 mm" IN THE FIRST LINE OF THE FIRST PARAGRAPH.

GA 8.1.3 Concrete

ADD THE FOLLOWING TO SUBCLAUSE 8.1.3.1:

"No allowance will be made for concrete required to make up over break in rock material and to make up over excavation in material other than rock."

ADD THE FOLLOWING SUB ITEM (e):

"(e) The cost of sand broomed into no-fines blinding shall be included in the rate for no-fines blinding."

ADD THE FOLLOWING SUBCLAUSE 8.1.4:

"GA 8.1.4 Casting in of pipes and specials

No separate items will be scheduled for building in items supplied under this contract except for those specially measured in the Schedule of Quantities. The relevant rates for supply and installation shall cover the cost for casting in of the items supplied under this contract irrespective of whether the items are positioned prior to construction or subsequently placed in blocked-out holes."

GA 8.4 SCHEDULED CONCRETE ITEMS

ADD THE FOLLOWING ADDITIONAL PAYMENT ITEMS:

**"GA 8.4.5 No-fines Concrete (describe class and position)
(Additional payment item).....Unit: m³**

The relevant measurement and payment clauses for strength concrete (clause 8.4.3) shall apply.

**GA 8.4.6 Curing of concrete (structure to be stated)
(Additional payment item)..... Unit: Provisional Sum**

The stated fixed provisional sum shall include all costs to cure the concrete as specified in Clause 5.4.7 and G-5.4.7 in the structures stated. The curing of concrete in other structures not stated will be deemed to be included in the rates

tendered for concrete under item 8.4.3. Payment of the stated provisional sum will be made in accordance with A-8.1.3 (b).

GA 8.4.7 Miscellaneous Items

These items will be measured per metre, per square metre, per cubic metre or per number or as a sum as scheduled.

The rate or sum shall cover the cost of the complete supply and installation of the scheduled item in accordance with the specifications and as described in the Schedule of Quantities and as detailed on the drawings including casting into concrete where applicable.”

CC1 CONCRETE WORKS (STRUCTURAL) - (SUPPLEMENT TO SANS 2001-CC1: 2012)

The following specification is drawn up with SANS 1200 G as a basis and supplements the provisions of SANS 2001-CC1: 2012

CC1- 4 REQUIREMENTS

CC1- 4.2 MATERIALS

CC1- 4.2.1 Cementitious binders

Add the following sentence to the end of 4.2.1.2:

“Where the manufacturer of a cementitious binder specifies more stringent storage conditions to those prescribed by this sub-clause then the manufacturer’s requirements shall take precedence

Where the cement is supplied in bags, the bags shall be closely and neatly stacked to a height not exceeding 12 bags with different brands and/or types of the same brand stored separately.”.

Substitute 4.2.1.3 with the following:

“4.2.1.3 Cement shall not be kept in storage on site for longer than eight weeks or the storage time prescribed by the manufacturer whichever is less”.

CC1- 4.2.3 Aggregates

Add the following sentence to the end of 4.2.3.7:

“In addition to the above, sand is to be stored in such a way that contamination by foreign matter is prevented.”

CC1- 4.3 FORMWORK

CC1- 4.3.2 Design and Construction of Formwork and Falsework

CC1- 4.3.2.1 General

Add the following sub-clause to the end of 4.3.2.1:

“4.3.2.1.7 The design and construction of formwork and Falsework will be the responsibility of the Contractor, however, the Engineer shall review the design and construction thereof for approval. The design and construction of Formwork and Falsework shall comply with all Occupational Health and Safety Act and accompanying regulatory requirements – in addition to the requirements contained in CC1:2012”.

CC1- 4.7 QUALITY OF CONCRETE

CC1- 4.7.8 Mixing

Add the following before section 4.7.8.1:

“The concrete mix shall be designed by a specialist organization. No concrete shall be placed until the Contractor’s concrete mix design has been approved by the Engineer. The Contractor shall submit to the Engineer a statement of the mix proportion proposed, together with a report from the specialist organization, showing the 28 day concrete strength obtained when using the material proposed for the work. The cost of the concrete mix design shall be borne by the Contractor and shall be deemed to be included in the rates for concrete work.

Admixtures may be used to increase the workability of the concrete but only with the express approval of the Engineer and when the details of the active ingredients of the admixture and their effects are supplied to the Engineer for approval before use. No additives likely to impair low permeability of the concrete will be approved.”

CC1- 4.8 PRECAST CONCRETE

Add the following before section 4.8.1:

“The client employer is indemnified against all claims resulting/which may result from or for infringement of patent rights, design or trademarks in respect of any precast system used in connection with the works and the payment of any

royalties due, or that might become due, as a result of the use of such a system.”

CC1- 4.10 HANDLING AND ERECTION OF PRECAST CONCRETE UNITS

Replace the first sentence of sub-clause 4.10.3.1 with the following:

“4.10.3.1. Temporary supports shall be so designed and arranged, by the Contractor and reviewed by the Engineer for Approval, that account is taken of:
”

Add the following sub-clause to SANS 2001-CC1:2012:

“CC1 - 6 MEASUREMENT AND PAYMENT

The entire provisions of SANS 1200 G:1982 part 8 (Measurement and Payment) shall apply and where reference is made to clauses/sub-clauses in SANS 1200 G:1982 the equivalent clauses in SANS 2001-CC1:2012 shall be applicable instead – where reference is made to other parts of SANS 1200 then the relevant SANS 2001 standard (where applicable) shall be applicable instead.”

PSHA: STRUCTURAL STEELWORK (SUNDRY ITEMS) (Applicable to SANS 1200 HA 1990)

PSHA 3 MATERIALS

PSHA 3.1 Structural Steel

Delete the Sub-Clause and substitute:

Except where scheduled to the contrary or shown on the Drawings, the grade of steel to be used in the manufacture of the following shall be that grade normally supplied by reputable manufacturers approved by the Engineer for the following items:

- (i) Hand railing systems
- (ii) Open grid flooring systems
- (iii) Steel plate flooring
- (iv) Stair treads (but excluding supporting steelwork)
- (v) Valve chamber access ladders and accessories

All structural steelwork which shall include ladders, safety cages and platforms, shall be manufactured from S355JR+N grade steel in conformity with SANS 1431, except where shown to the contrary on the Drawings or in the schedule of quantities.

All stainless steel shall be grade 304, except where shown to the contrary on the Drawings or in the schedule of quantities.

Grade 3CR12 corrosion resistant steel shall be used where scheduled or shown on the Drawings.

PSHA 5 CONSTRUCTION

PSHA 5.1.2 Shop Details

Add to the Sub-Clause:

The Contractor shall prepare his own shop details based on the dimensions and details given on the Drawings but will not be required to submit his shop details to the Engineer.

PSHA 5.2.6 Handrails

Add to the Sub-Clause:

Handrailing shall be of the Mono type industrial steel handrailing generally in compliance with the latest edition of the steel design data entitled "Steel

Construction Industry Minimum Standard for Tubular Steel Handrailing Systems" published by the SA Institute of Steel Construction, but as may be amended by the following requirements.

The stanchions shall be hollow steel tube with an outside diameter of at least 43 mm and a wall thickness in excess of 3 mm. Spheres shall be formed at all intersections to allow the fitting of hand and knee rails and the design shall preclude the formation of possible moisture traps. Hand and knee rails shall be a hollow steel tube with an OD of at least 34 mm and a wall thickness in excess of 2,5 mm.

The layout and mountings for the handrail shall be shown on the drawings. The unit of measurement for handrailing is per linear metre of installed handrail generally measured horizontally along the length of the completed unit or on the slope in the case of stairways or ramps. The rate quoted per metre is to include for the supply and installation of the handrail, knee rail, stanchions, footings, holding down bolts and nuts and is to be inclusive of all cutting, mitring, welding, grinding and waste.

PSHA 5.2.7 Ladders

Steel stairs and ladders are to be provided in accordance with the details shown on the Drawings.

Aluminium ladders where required, are to be provided in accordance with the details shown on the Drawings.

PSHA 5.2.8 Open Grid Floors

Steel flooring is to be of the rectangular type open grid steel flooring (50 mm deep with open grid measuring 40 x 40 mm and fabricated from bearers at least 5,5 mm thick) as supplied by Messrs Andrew Mentis (or similar approved type) cut and framed to the required panel shapes and sizes shown on the Drawings.

PSHA 5.2.9 Floorplate Floors

Floorplate floors shall be diamond pattern 8 mm thick, weighing 57 kg per m² or of thickness as otherwise specified in the Schedule of Quantities, and shall be cut to the requisite sizes and holed as required and stiffened with 40 x 40 x 5 mm angle iron where necessary.

Kerbing to the edge of openings shall be made of 50 x 50 x 6 mm mild steel angle iron with an 8 x 8 mm square welded on, so as to form a bearing edge supporting the chequer plate cover. Fish tail lugs, 150 mm long are to be welded to the back of the angle at 600 mm centres. The angle is to be set with its vertical leg flush with the finished face of the concrete, the other leg being

bedded into the concrete and the 8 x 8 mm square shall be so welded to the angle that when the chequer plate is in position, it shall be flush with the upper edge of the frame.

Alternatively, approved pressed steel kerbing with a rebate of 25 x 8 mm shall be with anchor clips at 300 mm centres may be provided where indicated on the Drawings or in the schedule of quantities.

PSHA 5.2.10 Protective Treatment

Add to the Sub-Clause :

Rolled steel sections shall be painted in accordance with the details given in SABS 1200 HC as amended by PSHC or by other specification which may be included with this document. All other mild steel shall be hot-dip galvanised except where shown to the contrary on the Drawings or in the schedule of quantities. Hot-dip galvanising shall conform to SABS 763 for heavy duty coatings or an equivalent Specification, approved by the Engineer. Screwed and socketed tubing shall be galvanised in compliance with BS 1387. Galvanised malleable cast iron fittings shall comply with SABS 509.

PSHA 5.3.6 Grouting

Add to the Sub-Clause :

The Contractor will be fully responsible for all grouting work under this Contract.

PSHA 6 TOLERANCES

PSHA 6.1.3 Accuracy of Erection

Add to the Sub-Clause :

The accuracy of erection shall be the degree of accuracy 11 as tabulated but amended as follows:

In items d) 1) and d) 2) of the table the Degree of Accuracy given as " ± 5 " shall be read as " ± 3 ".

PSHA 7 TESTING

PSHA 7.1 Test Certificates

Delete the part sentence "in terms of the project specification" from the wording of the Sub-Clause and add the words "when so requested by the former" at the end of the sentence.

PSHA 8 MEASUREMENT AND PAYMENT
PSHA 8.3 Scheduled Items

Add the following introduction to the subsequent Sub-Clauses:

The tendered rates shall cover the cost of preparing shop details (where applicable), the supply of all materials, fabrication, process control, loading, transporting to Site, off-loading, erection (unless separately included), setting into concrete or brickwork and grouting in. They shall also include for the supply of all nuts, bolts, holding down bolts, washers, rivets, cutting to waste, all temporary bracing, templates and shuttering necessary for installing, transporting and erecting.

Where the scheduled items for steelwork include corrosion protection, then the price stated shall also include for such protection as specified in SABS 1200 HC.

Where the requirements of the above introduction conflict with the requirements of Sub-Clauses 8.3.1 to 8.3.6 inclusive, the requirements of the introduction shall take precedence.

PSHA 8.3.7 Grab rails.

The rate shall cover the cost of manufacturing or supplying, installing and fixing the grab rails including any welding (where applicable), grouting in and all bolts complete with nuts and washers. In accordance with the drawing quoted.
..... Unit : No

PSHA 8.3.8 Valve Support.

The rate shall cover the cost of manufacturing or supplying, installing and fixing the valve support including any welding (where applicable), grouting in and all bolts complete with nuts and washers. In accordance with the drawing quoted.
..... Unit : No

PSHA 8.3.9 Steel Platform.

The rate shall cover the cost of manufacturing or supplying, installing and fixing the Steel Platform in accordance with the drawing quoted including

- structural steelwork, flooring, kick plates, cleats etc
- any welding (where applicable), grouting in and all bolts complete with nuts and washers.

..... Unit : No

PSHA 8.3.10 Collect and Install Manhole frames and covers.

The rate shall cover the cost for the collection, installation of the standard Rand Water manholes. The covers and frames will be supplied by Rand water as free-issue material and the Contractor will collect from Rand Water's Central Depot.
..... Unit : No

CS1 STRUCTURAL STEELWORK - (SUPPLEMENT TO SANS 2001-CS1: 2017)

CS1- 4 REQUIREMENTS

CS1- 4.2 DRAWINGS

CS1- 4.2.5 Erection drawings

Add the following sentence to the end of sub-clause 4.2.5.1:

“All temporary steelwork necessary for erection purposes shall be designed by a relevant competent person, registered as such with the Engineering Council of South Africa as a Professional Engineer or Engineering Technologist, in the employ of the Contractor.”

CS1 - 6 MEASUREMENT AND PAYMENT

The entire provisions of SANS 1200 H:1990 part 8 (Measurement and Payment) shall apply and where reference is made to clauses/sub-clauses in SANS 1200 H:1990 the equivalent clauses in SANS 2001-CS1:2017 shall be applicable instead – where reference is made to other parts of SANS 1200 then the relevant SANS 2001 standard (where applicable) shall be applicable instead.

SABS 1200 LB: BEDDING (Applicable to SANS 1200LB – 1983)

PSLB 2 INTERPRETATIONS

PSLB 2.3 Definitions

Delete “150 mm” in second line and substitute “300 mm”.

PSLB 3 MATERIALS

PSLB 3.1 Selected Granular Material

In the second line delete “19 mm” and substitute “6 mm”.

PSLB 3.2 Selected Fill Material

In the first line delete “PI not exceeding 6” and substitute “PI not exceeding 12”.

PSLB 3.3 Selection

PSLB 3.3.1 Suitable Material available from Trench Excavation

Delete the sub-clause and substitute the following:

The excavation of a pipe trench shall comply with the requirements of sub-clause 5.4 of SANS 1200DB, and the provisions of sub-clause 3.7 of SANS 1200DB (in terms of which, for the purposes of providing bedding materials, the Contractor is not required to use selective methods of excavating) shall apply. Nevertheless, the Contractor shall take every reasonable precaution to avoid burying or contaminating material this is suitable and is required for bedding or covering he pipeline. If, in the opinion of the Engineer, bedding material can be produced from the excavated material, the Contractor, if so ordered by the Engineer, shall screen or otherwise treat (as scheduled) the excavated material in order to produce material suitable for bedding (see also sub-clause 8.1.2).

PSLB 5 CONSTRUCTION

PSLB 5.1 General

PSLB 5.1.3 Placing

Delete sub-clause 5.1.3.4 and substitute:

Backfilling up to 300 mm above the top of the pipe shall be carried out immediately the pipes have been laid, and shall be completed before the

acceptance test is carried out except at joints which shall be left exposed until the pipeline has been satisfactorily tested.

PSLB 8 MEASUREMENT AND PAYMENT

PSLB 8.1 Basic Principles

Add the following:

Measurement and payment shall distinguish between items that are to be carried out using conventional construction methods and items that are to be carried out using labour-intensive construction methods.

PSLB 8.1.3 Volume of Bedding Materials

Add to the sub-clause:

- (c) The volume of bedding material shall be measured net i.e. The volume of the pipe is to be deducted.

PSLB 8.1.6 Freehaul

Delete the sub-clause and substitute the following:

With regards to Freehaul, Clause PSA 8.9 shall be applicable.

PSLB 8.2 Scheduled items

PSLB 8.2.1 Provision of Bedding from Trench Excavation

PSLB 8.2.1 Provision of Bedding from Trench Excavation

Delete the two paragraphs “The rate shall cover...” -- and “... around the pipeline.”” and replace with the following:

The rate shall cover the cost of acquiring, from the pipeline excavation, bedding material that complies with the relevant requirements of the specification and of delivering it to points alongside the trench spaced to suit the Contractors methods of working. The rate shall also cover the cost of handling bedding material from alongside the trench and placing it under and around the pipe.

-----Unit: m³

PSLB 8.2.1.1 Screening Material for Bedding

Add the following sub-clause:

Screening material for bedding:

- (a) Selected granular material..... Unit : m³
- (b) Selected fill material.....Unit:
m³

The rates for screening shall cover the extra-over cost for screening (where so ordered by the Engineer) material obtained and paid for in accordance with PSLB 8.2.1, above, in order to obtain material as specified.

Add the following item:

PSLB 8.2.2.2 From borrow pits

Amend Sub-Clause LB 8.2.2.2 to read as follows:

The rate shall cover the cost of acquiring the required bedding material, that complies with the relevant requirements of the specification, from borrow pits selected by the Contractor (subject to approval by the Engineer) and of delivering it to points alongside the trench spaced to suit the Contractors methods of working.. The rate shall also cover the cost of handling the bedding material from alongside the trench and placing it under and around the pipeline.

-----Unit: m³

PSLB 8.2.2.3 From commercial sources

The rate shall cover the cost of acquiring the required bedding material, that complies with the relevant requirements of the specification, from commercial sources and of delivering it to points alongside the trench spaced to suit the Contractors methods of working. The rate shall also cover the cost of handling the bedding material from alongside the trench and placing it under and around the pipeline.

-----Unit: m³

PSLB 8.2.2.4 From commercial sources (In dolomitic zones where the trench floor is inadequate)

The rate shall cover the cost of acquiring the required bedding material, that complies with the relevant requirements of the specification, from commercial sources and of delivering it to points alongside the trench spaced to suit the Contractors methods of working and of disposing of displaced material. The rate shall also cover the cost of handling bedding material from alongside the trench and placing it under and around the pipeline.

-----Unit: m³

PSLB 8.2.5 Overhaul

See PS 19 and PSA 8.9

PSLB 8.2.6 Soilcrete..... Unit : m³

Add the following new Sub-Clause:

The volume will be computed from the dimensions on the drawing or ordered by the Engineer. The rate shall cover the cost of dealing with any excavations (in all materials including disposal of surplus) that is additional to that measured under the item for pipe trench excavation and the cost of backfilling the trench in soilcrete.

PART 2.3 PS 4: PARTICULAR SPECIFICATION

CONTENTS

PART 3 - SHERQ SPECIFICATION

In the CD OR USB FLASH DRIVE disk namely PART 3

**PART 4 - ENVIRONMENTAL MANAGEMENT PLAN (“EMP”) & ENVIRONMENTAL
AUTHORISATION (“EA”) (WHERE APPLICABLE)**

In the CD OR USB FLASH DRIVE disk namely PART 4

ANNEXURE C5: SITE INFORMATION

PART 5 – SITE DATA, RULES & REGULATIONS

PART 5.1 – SITE DATA

5.1.1 SITE LOCATION

The site is at LETHABO INTAKE STATION is on Dihlsabake Road in the Free State, it is approximately 82 km from Rand Water Head Office in Glenvista, Gauteng. The coordinates for the locality of the site are: Latitude 26^o43'72" S and Longitude 27^o59'29.71"E.

GPS Coordinates: S 260 43'72" and E 270 59'29.71"E

5.1.2 SITE BOUNDARIES

The Contractor shall confine his activities to the area in the vicinity of designated sites, which is fenced. The actual boundaries of the site will be pointed out by the Engineer. The Contractor shall not extend his activities outside the boundaries unless the Engineer has specifically authorised the extension in writing.

PART 5.2 – SITE RULES & REGULATIONS

5.2.3 SITE ACCESS

A Site Access Certificate will be required before the Contractor is granted access to site. Please see Additional Particular Conditions of Contract for details of this certificate and where to obtain it.

5.2.4 POSSESSION OF SITE

The written order to commence the work will be deemed to give the Contractor possession of the site. In the event of any portion of the work or completion of the contract being delayed due to the Employer delaying the Contractor in taking possession of the site, an extension of time may be allowed by the Engineer. The Employer shall not be liable for any payment in respect of such delays.

5.2.5 ACCOMMODATION ON SITE

No housing is available. The Contractor's employees will not be allowed to be accommodated on the site.

The Contractor shall erect, maintain and remove on completion of the work, ample temporary offices and sheds to the Engineer's approval, for proper storage of perishable and other materials and for the use of the workmen.

5.2.6 LATRINES

The Contractor shall provide latrine accommodation on the site in the form of chemical closets for the use of persons employed on the works for the duration of the contract, All latrine accommodation provided by the Contractor shall be efficient, sanitary and non-offensive and all sanitary fees payable to any local authority shall be paid by the Contractor.

5.2.7 ACCESS ROADS

The Contractor shall be liable for all unnecessary and unreasonable damage caused by his equipment and/or transport to the access roads and fences. The cost of repair and reinstatement of unnecessary and unreasonable damage to these roads and fences will be deducted from moneys due to the Contractor.

5.2.8 SERVICES ON SITE

There is no compressed air available on the site. Limited water and electricity will be provided.

5.2.9 SITE SECURITY

The sites are subject to strict security control and the Contractor and his work staff shall comply fully with any requirements imposed by the Employer's security personnel. Permits, issued by the Manager of the site, are required for admission to the sites. Before starting work on the sites, the Contractor shall make arrangements with the Engineer for the issue of the necessary permits for himself and his employees. For purposes of identification, all personnel will be required to carry their identity documents and shall show these, on request, either at entry to the Designated Pumping Station or within the Pumping Station site. The Contractor and his employees will be confined to the site and the access roads listed above. Action will be taken against anyone outside the prescribed areas.

5.2.10 CLEANING UP OF WORKS AND SITE

The Contractor shall maintain the whole of the site in a clean and orderly condition, to the satisfaction of the Engineer. On completion of the work the Contractor shall tidy up the site to the satisfaction of the Engineer. All temporary buildings shall be dismantled and removed. All surplus material, debris, etc. shall be carted away and the whole site shall be left in a neat and orderly condition.

PART 5.3 - GEOTECHNICAL REPORT

Not available

PART 5.4 APPENDICES

- Appendix A: Electrical BOQ
- Appendix B: Automation BOQ
- Appendix C: Mechanical BOQ

5.4.1 Appendix A - Electrical BOQ



Lethabo Pump Station:
Header upgrade at LETHABO INTAKE
STATION

**E-BOQ : Electrical Bill of Quantities detail
Breakdown**

Item No.	Reference: RW10396363/22/Elec- Spec	Description	U O M	Qty (A)	Rate (B)	Amount (A*B)
18.1	DESIGN					
18.1.1	2.1	Design pack	Sum	1		
18.1.2	2.3	Detailed designs	Sum	1		
18.1.3	2.3	As-built drawings	Sum	1		
18.1.4	3.9.1	Services Detection (Along the route of the cable trench)	Sum	1		
18.1.5	3.10.4	Soil Resistivity Tests	Sum	1		
18.1.6	2.2	Construction Supervision	Sum	1		
18.1.7		Protection of all existing services along cable route during installation	Sum	1		
18.2	MANUFACTURE AND SUPPLY					
18.2.1	3.2	Main Boundary Valve Distribution Board	Each	1		
18.2.2		BOUNDARY VALVE SUB-DISTRIBUTION BOARDS				
18.2.2.1	3.3	Type A Sub-DB	Each	2		

18.2.2.2	3.3	Type B Sub-DB	Each	2		
18.2.2.3	3.3	Type C Sub-DB	Each	7		
18.2.2.4	3.3	Type D Sub-DB	Each	3		
18.2.3	3.5	10A ,5kA Sump Pump Control Panels	Each	14		
18.2.4	3.6	20, 5kA Isolation Panels	Each	23		
18.2.5	3.4	Uninterruptable Power Supply (UPS) unit complete with bypass circuit	Each	1		
18.2.6	3.8	600/1000V PVC SWAPVC INSULATED COPPER CABLE TO SANS 1507				
18.2.6.1		70mm ² ,4core	m	100		
18.2.6.2		25mm ² ,4core	m	200		
18.2.6.3		16mm ² , 4core	m	500		
18.2.6.4		4mm ² , 4core	m	200		
18.2.6.5		2.5mm ² , 3core	m	500		
18.2.7	3.8	TERMINATE 600/1000V PVC SWAPVC INSULATED COPPER CABLE TO SANS 1507				
18.2.7.1		70mm ² ,4core	Each	6		
18.2.7.2		25mm ² ,4core	Each	6		
18.2.7.3		16mm ² , 4core	Each	30		
18.2.7.4		4mm ² , 4core	Each	30		
18.2.7.5		2.5mm ² , 3core	Each	120		
18.2.8	3.8	CONDUCTIVE ANTI-THEFT EARTH CABLE				
18.2.8.1		16mm ²	m	1000		
18.2.8.2		10mm ²	m	1000		
18.2.9	3.8	TERMINATE CONDUCTIVE ANTI-THEFT EARTH CABLE				
18.2.9.1		16mm ²	Each	42		
18.2.9.2		10mm ²	Each	40		
18.2.10	3.8.7	Cable Support and Accessories (Per Valve	Sum	1		

		Chamber)			
18.2.11	3.9	EXCAVATE AND BACKFILL CABLE TRENCH			
18.2.11.1		Class 1: Pickable earth	Sum	1	
18.2.11.2		Class 2: Hard Rock	Sum	1	
18.2.11.3	3.9.8	100mm PVC Sleeves for road crossing	Sum	1	
18.2.11.4	3.9.9	Services Crossing PVC Sleeves	Sum	1	
18.2.11.5	3.9.10	Concrete covers for road crossing (100mm thick, 500mm wide per road width)	Sum	1	
18.2.11.6	3.9.7	Danger Tape	Sum	1	
18.2.12	3.9.11	Cable Markers	Sum	1	
18.2.13	3.7	SMALL POWER AND LIGHTING			
18.2.13.1		Valve Chamber 2A complete SP&L	Sum	1	
18.2.13.2		Valve Chamber 2B complete SP&L	Sum	1	
18.2.13.3		Valve Chamber 3 complete SP&L	Sum	1	
18.2.13.4		Valve Chamber 4 complete SP&L	Sum	1	
18.2.13.5		Valve Chamber 5 complete SP&L	Sum	1	
18.2.13.6		Valve Chamber 6 complete SP&L	Sum	1	
18.2.13.7		Valve Chamber 7 complete SP&L	Sum	1	
18.2.13.8		Valve Chamber 8 complete SP&L	Sum	1	
18.2.13.9		Valve Chamber 9 complete SP&L	Sum	1	
18.2.13.10		Valve Chamber 11 complete SP&L	Sum	1	
18.2.13.11		Valve Chamber 12 complete SP&L	Sum	1	
18.2.13.12		Valve Chamber 13 complete SP&L	Sum	1	
18.2.13.13		Valve Chamber 14 complete SP&L	Sum	1	
18.2.13.14		Valve Chamber 15 complete SP&L	Sum	1	
18.2.14	3.8.6	Epoxy sealing foam	Sum	1	
18.2.15		EARTHING AND SURGE SUPPRESSION			
18.2.15.1	3.10.3	Earth Electrodes	Each	15	
18.2.15.2	3.10.6	Post-installation earthing and bonding system tests and submit test report.	Sum	1	
18.2.15.3	3.10.5	Surge Suppression	Each	15	

18.2.16	5	Drawings, Operation and Maintenance Manuals	Sum	1		
18.3	FACTORY ACCEPTANCE TESTING					
18.3.1	3.2	Main Boundary Valve Distribution Board	Each	1		
18.3.2		BOUNDARY VALVE SUB-DISTRIBUTION BOARDS				
18.3.2.1	3.3	Type A Sub-DB	Each	2		
18.3.2.2	3.3	Type B Sub-DB	Each	2		
18.3.2.3	3.3	Type C Sub-DB	Each	7		
18.3.2.4	3.3	Type D Sub-DB	Each	3		
18.3.3	3.5	10A ,5kA Sump Pump Control Panels	Each	14		
18.3.4	3.6	20, 5kA Isolation Panels	Each	23		
18.3.5	3.4	Uninterruptable Power Supply (UPS) unit complete with bypass circuit	Each	1		
18.3.6	3.8	600/1000V PVCSWAPVC INSULATED COPPER CABLE TO SANS 1507				
18.3.6.1		70mm ² ,4core	m	100		
18.3.6.2		25mm ² ,4core	m	200		
18.3.6.3		16mm ² , 4core	m	500		
18.3.6.4		4mm ² , 4core	m	200		
18.3.6.5		2.5mm ² , 3core	m	500		
18.3.7	3.8	SUPPLY, TEST and INSTALL CONDUCTIVE ANTI-THEFT EARTH CABLE				
18.3.7.1		16mm ²	m	1000		
18.3.7.2		10mm ²	m	1000		

18.3.8	3.8.7	Cable Support and Accessories (Per Valve Chamber)	Sum	1		
18.3.9	3.7	SMALL POWER AND LIGHTING				
18.3.9.1		Valve Chamber 2A complete SP&L	Sum	1		
18.3.9.2		Valve Chamber 2B complete SP&L	Sum	1		
18.3.9.3		Valve Chamber 3 complete SP&L	Sum	1		
18.3.9.4		Valve Chamber 4 complete SP&L	Sum	1		
18.3.9.5		Valve Chamber 5 complete SP&L	Sum	1		
18.3.9.6		Valve Chamber 6 complete SP&L	Sum	1		
18.3.9.7		Valve Chamber 7 complete SP&L	Sum	1		
18.3.9.8		Valve Chamber 8 complete SP&L	Sum	1		
18.3.9.9		Valve Chamber 9 complete SP&L	Sum	1		
18.3.9.10		Valve Chamber 11 complete SP&L	Sum	1		
18.3.9.11		Valve Chamber 12 complete SP&L	Sum	1		
18.3.9.12		Valve Chamber 13 complete SP&L	Sum	1		
18.3.9.13		Valve Chamber 14 complete SP&L	Sum	1		
18.3.9.14		Valve Chamber 15 complete SP&L	Sum	1		
18.3.10		EARTHING AND SURGE SUPPRESSION				
18.3.10.1	3.10.3	Earth Electrodes	Each	15		
18.3.10.2	3.10.6	Post-installation earthing and bonding system tests and submit test report.	Sum	1		
18.3.10.3	3.10.5	Surge Suppression	Each	15		
18.4	DELIVERY					
18.4.1	3.2	Main Boundary Valve Distribution Board	Each	1		
18.4.2		BOUNDARY VALVE SUB-DISTRIBUTION BOARDS				
18.4.2.1	3.3	Type A Sub-DB	Each	2		
18.4.2.2	3.3	Type B Sub-DB	Each	2		
18.4.2.3	3.3	Type C Sub-DB	Each	7		

18.4.2.4	3.3	Type D Sub-DB	Each	3		
18.4.3	3.5	10A ,5kA Sump Pump Control Panels	Each	14		
18.4.4	3.6	20, 5kA Isolation Panels	Each	23		
18.4.5	3.4	Uninterruptable Power Supply (UPS) unit complete with bypass circuit	Each	1		
18.4.6	3.8	SUPPLY, TEST and INSTALL 600/1000V PVC SWAP PVC INSULATED COPPER CABLE TO SANS 1507				
18.4.6.1		70mm ² , 4core	m	100		
18.4.6.2		25mm ² , 4core	m	200		
18.4.6.3		16mm ² , 4core	m	500		
18.4.6.4		4mm ² , 4core	m	200		
18.4.6.5		2.5mm ² , 3core	m	500		
18.4.7	3.8	TERMINATE 600/1000V PVC SWAP PVC INSULATED COPPER CABLE TO SANS 1507				
18.4.7.1		70mm ² , 4core	Each	6		
18.4.7.2		25mm ² , 4core	Each	6		
18.4.7.3		16mm ² , 4core	Each	30		
18.4.7.4		4mm ² , 4core	Each	30		
18.4.7.5		2.5mm ² , 3core	Each	120		
18.4.8	3.8	SUPPLY, TEST and INSTALL CONDUCTIVE ANTI-THEFT EARTH CABLE				
18.4.8.1		16mm ²	m	1000		
18.4.8.2		10mm ²	m	1000		
18.4.9	3.8	TERMINATE CONDUCTIVE ANTI-THEFT EARTH CABLE				
18.4.9.1		16mm ²	Each	42		
18.4.9.2		10mm ²	Each	40		

18.4.10	3.8.7	Cable Support and Accessories (Per Valve Chamber)	Sum	1		
18.4.11	3.9	EXCAVATE AND BACKFILL CABLE TRENCH				
18.4.11.1		Class 1: Pickable earth	Sum	1		
18.4.11.2		Class 2: Hard Rock	Sum	1		
18.4.11.3	3.9.8	100mm PVC Sleeves for road crossing	Sum	1		
18.4.11.4	3.9.9	Services Crossing PVC Sleeves	Sum	1		
18.4.11.5	3.9.10	Concrete covers for road crossing (100mm thick, 500mm wide per road width)	Sum	1		
18.4.11.6	3.9.7	Danger Tape	Sum	1		
18.4.12	3.9.11	Cable Markers	Sum	1		
18.4.13	3.7	SMALL POWER AND LIGHTING				
18.4.13.1		Valve Chamber 2A complete SP&L	Sum	1		
18.4.13.2		Valve Chamber 2B complete SP&L	Sum	1		
18.4.13.3		Valve Chamber 3 complete SP&L	Sum	1		
18.4.13.4		Valve Chamber 4 complete SP&L	Sum	1		
18.4.13.5		Valve Chamber 5 complete SP&L	Sum	1		
18.4.13.6		Valve Chamber 6 complete SP&L	Sum	1		
18.4.13.7		Valve Chamber 7 complete SP&L	Sum	1		
18.4.13.8		Valve Chamber 8 complete SP&L	Sum	1		
18.4.13.9		Valve Chamber 9 complete SP&L	Sum	1		
18.4.13.10		Valve Chamber 11 complete SP&L	Sum	1		
18.4.13.11		Valve Chamber 12 complete SP&L	Sum	1		
18.4.13.12		Valve Chamber 13 complete SP&L	Sum	1		
18.4.13.13		Valve Chamber 14 complete SP&L	Sum	1		
18.4.13.14		Valve Chamber 15 complete SP&L	Sum	1		
18.4.14	3.8.6	Epoxy sealing foam	Sum	1		
18.4.15		EARTHING AND SURGE SUPPRESSION				
18.4.15.1	3.10.3	Earth Electrodes	Each	15		
18.4.15.2	3.10.6	Post-installation earthing and bonding system tests and submit test report.	Sum	1		

18.4.15.3	3.10.5	Surge Suppression	Each	15		
18.4.16	5	Drawings, Operation and Maintenance Manuals	Sum	1		
18.5	CONSTRUCTION AND INSTALLATION					
18.5.1	3.2	Main Boundary Valve Distribution Board	Each	1		
18.5.2		BOUNDARY VALVE SUB-DISTRUBUTION BOARDS				
18.5.2.1	3.3	Type A Sub-DB	Each	2		
18.5.2.2	3.3	Type B Sub-DB	Each	2		
18.5.2.3	3.3	Type C Sub-DB	Each	7		
18.5.2.4	3.3	Type D Sub-DB	Each	3		
18.5.3	3.5	10A ,5kA Sump Pump Control Panels	Each	14		
18.5.4	3.6	20, 5kA Isolation Panels	Each	23		
18.5.5	3.4	Uninterruptable Power Supply (UPS) unit complete with bypass circuit	Each	1		
18.5.6	3.8	SUPPLY, TEST and INSTALL 600/1000V PVC SWAPVC INSULATED COPPER CABLE TO SANS 1507				
18.5.6.1		70mm ² ,4core	m	100		
18.5.6.2		25mm ² ,4core	m	200		
18.5.6.3		16mm ² , 4core	m	500		
18.5.6.4		4mm ² , 4core	m	200		
18.5.6.5		2.5mm ² , 3core	m	500		
18.5.7	3.8	TERMINATE 600/1000V PVC SWAPVC INSULATED COPPER CABLE TO SANS 1507				
18.5.7.1		70mm ² ,4core	Each	6		
18.5.7.2		25mm ² ,4core	Each	6		

18.5.7.3		16mm2, 4core	Each	30		
18.5.7.4		4mm2, 4core	Each	30		
18.5.7.5		2.5mm2, 3core	Each	120		
18.5.8	3.8	SUPPLY, TEST and INSTALL CONDUCTIVE ANTI-THEFT EARTH CABLE				
18.5.8.1		16mm2	m	1000		
18.5.8.2		10mm2	m	1000		
18.5.9	3.8	TERMINATE CONDUCTIVE ANTI-THEFT EARTH CABLE				
18.5.9.1		16mm2	Each	42		
18.5.9.2		10mm2	Each	40		
18.5.10	3.8.7	Cable Support and Accessories (Per Valve Chamber)	Sum	1		
18.5.11	3.9	EXCAVATE AND BACKFILL CABLE TRENCH				
18.5.11.1		Class 1: Pickable earth	Sum	1		
18.5.11.2		Class 2: Hard Rock	Sum	1		
18.5.11.3	3.9.8	100mm Sleeves for road crossing	Sum	1		
18.5.11.4	3.9.9	Services Crossing	Sum	1		
18.5.11.5	3.9.10	Concrete covers for road crossing (100mm thick, 500mm wide per road width)	Sum	1		
18.5.11.6	3.9.7	Danger Tape	Sum	1		
18.5.12	3.9.11	Cable Markers	Sum	1		
18.5.13	3.7	SMALL POWER AND LIGHTING				
18.5.13.1		Valve Chamber 2A complete SP&L	Sum	1		
18.5.13.2		Valve Chamber 2B complete SP&L	Sum	1		
18.5.13.3		Valve Chamber 3 complete SP&L	Sum	1		
18.5.13.4		Valve Chamber 4 complete SP&L	Sum	1		
18.5.13.5		Valve Chamber 5 complete SP&L	Sum	1		
18.5.13.6		Valve Chamber 6 complete SP&L	Sum	1		
18.5.13.7		Valve Chamber 7 complete SP&L	Sum	1		
18.5.13.8		Valve Chamber 8 complete SP&L	Sum	1		

18.5.13.9		Valve Chamber 9 complete SP&L	Sum	1		
18.5.13.10		Valve Chamber 11 complete SP&L	Sum	1		
18.5.13.11		Valve Chamber 12 complete SP&L	Sum	1		
18.5.13.12		Valve Chamber 13 complete SP&L	Sum	1		
18.5.13.13		Valve Chamber 14 complete SP&L	Sum	1		
18.5.13.14		Valve Chamber 15 complete SP&L	Sum	1		
18.5.14	3.8.6	Epoxy sealing foam	Sum	1		
18.5.15		EARTHING AND SURGE SUPPRESSION				
18.5.15.1	3.10.3	Earth Electrodes	Each	15		
18.5.15.2	3.10.6	Post-installation earthing and bonding system tests and submit test report.	Sum	1		
18.5.15.3	3.10.5	Surge Suppression	Each	15		
18.5.16	5	Drawings, Operation and Maintenance Manuals	Sum	1		
18.6	SITE ACCEPTANCE TESTING					
18.6.1	3.2	Main Boundary Valve Distribution Board	Each	1		
18.6.2		BOUNDARY VALVE SUB-DISTRUBUTION BOARDS				
18.6.2.1	3.3	Type A Sub-DB	Each	2		
18.6.2.2	3.3	Type B Sub-DB	Each	2		
18.6.2.3	3.3	Type C Sub-DB	Each	7		
18.6.2.4	3.3	Type D Sub-DB	Each	3		
18.6.3	3.5	10A ,5kA Sump Pump Control Panels	Each	14		
18.6.4	3.6	20, 5kA Isolation Panels	Each	23		
18.6.5	3.4	Uninterruptable Power Supply (UPS) unit complete with bypass circuit	Each	1		

18.6.6	3.8	SUPPLY, TEST and INSTALL 600/1000V PVC SWAPVC INSULATED COPPER CABLE TO SANS 1507				
18.6.6.1		70mm ² , 4core	m	100		
18.6.6.2		25mm ² , 4core	m	200		
18.6.6.3		16mm ² , 4core	m	500		
18.6.6.4		4mm ² , 4core	m	200		
18.6.6.5		2.5mm ² , 3core	m	500		
18.6.7	3.8	TERMINATE 600/1000V PVC SWAPVC INSULATED COPPER CABLE TO SANS 1507				
18.6.7.1		70mm ² , 4core	Each	6		
18.6.7.2		25mm ² , 4core	Each	6		
18.6.7.3		16mm ² , 4core	Each	30		
18.6.7.4		4mm ² , 4core	Each	30		
18.6.7.5		2.5mm ² , 3core	Each	120		
18.6.8	3.8	SUPPLY, TEST and INSTALL CONDUCTIVE ANTI-THEFT EARTH CABLE				
18.6.8.1		16mm ²	m	1000		
18.6.8.2		10mm ²	m	1000		
18.6.9	3.8	TERMINATE CONDUCTIVE ANTI-THEFT EARTH CABLE				
18.6.9.1		16mm ²	Each	42		
18.6.9.2		10mm ²	Each	40		
18.6.10	3.8.7	Cable Support and Accessories (Per Valve Chamber)	Sum	1		
18.6.11	3.9	EXCAVATE AND BACKFILL CABLE TRENCH				
18.6.11.1		Class 1: Pickable earth	Sum	1		
18.6.11.2		Class 2: Hard Rock	Sum	1		
18.6.11.3	3.9.8	100mm Sleeves for road crossing	Sum	1		
18.6.11.4	3.9.9	Services Crossing	Sum	1		

18.6.11.5	3.9.10	Concrete covers for road crossing (100mm thick, 500mm wide per road width)	Sum	1		
18.6.11.6	3.9.7	Danger Tape	Sum	1		
18.6.12	3.9.11	Cable Markers	Sum	1		
18.6.13	3.7	SMALL POWER AND LIGHTING				
18.6.13.1		Valve Chamber 2A complete SP&L	Sum	1		
18.6.13.2		Valve Chamber 2B complete SP&L	Sum	1		
18.6.13.3		Valve Chamber 3 complete SP&L	Sum	1		
18.6.13.4		Valve Chamber 4 complete SP&L	Sum	1		
18.6.13.5		Valve Chamber 5 complete SP&L	Sum	1		
18.6.13.6		Valve Chamber 6 complete SP&L	Sum	1		
18.6.13.7		Valve Chamber 7 complete SP&L	Sum	1		
18.6.13.8		Valve Chamber 8 complete SP&L	Sum	1		
18.6.13.9		Valve Chamber 9 complete SP&L	Sum	1		
18.6.13.10		Valve Chamber 11 complete SP&L	Sum	1		
18.6.13.11		Valve Chamber 12 complete SP&L	Sum	1		
18.6.13.12		Valve Chamber 13 complete SP&L	Sum	1		
18.6.13.13		Valve Chamber 14 complete SP&L	Sum	1		
18.6.13.14		Valve Chamber 15 complete SP&L	Sum	1		
18.6.14	3.8.6	Epoxy sealing foam	Sum	1		
18.6.15		EARTHING AND SURGE SUPPRESSION				
18.6.15.1	3.10.3	Earth Electrodes	Each	15		
18.6.15.2	3.10.6	Post-installation earthing and bonding system tests and submit test report.	Sum	1		
18.6.15.3	3.10.5	Surge Suppression	Each	15		
18.7	COMMISSIONING					
18.7.1	2.2	Commissioning of the complete electrical installation	Sum	1		

18.7.2	2.2	Certificates of Compliance and Assembly Evaluators Certificates for all equipment and the installation	Sum	1		
18.7.3		Decommissioning of redundant equipment on completion of works	Sum	1		
18.7.4		Transporting decommissioned equipment to Rand Water Depot	Sum	1		
18.8		Provide the details and pricing of any additional design, supply, manufacture, testing, delivery, installation and commissioning work that in the opinion of the bidder is required to complete all the work as specified as required on the applicable drawings and the system specification. If no details are provided below, the contractor shall not be allowed any claims to complete any outstanding work which may be identified during contract execution as specified.				
18.8.1			Sum	1		
18.8.2			Sum	1		
18.8.3			Sum	1		
18.8.4			Sum	1		
18.8.5						
SUB- TOTAL : ELECTRICAL						

5.4.2 Appendix B – Automation BOQ



Lethabo Pump Station:

Header upgrade at LETHABO INTAKE STATION

**Appendix B: Automation
BOQ Detail Breakdown**

Item No.	Reference: RW10396363/21/Aut- Spec	Description	U O M	Qty (A)	Rate (B)	Amount (A*B)
19		AUTOMATION				
19.1	3.1	Design				
19.1.1	3.1.1	Design pack	Sum	1		
19.1.2		Detailed designs	Sum	1		
19.1.3		As-built drawings	Sum	1		
19.2	3.2	B19 pipeline				
19.2.1	3.2.1	Sump pump PLC	Sum			
19.2.2	3.2.2	Galvanized Kiosk	each	1		
19.2.3	3.2.3	Earthing and lightning protection	Sum			
19.2.4	3.2.4.1	220VAC/24VDC redundant power supplies	each	2		
19.2.5	3.2.4.2	Quint Diode modules	each	1		
19.2.6	3.2.4.3	Profibus DP compliant electromagnetic flow meter with remote mount transmitter	each	1		
19.2.7	3.2.4.4	Profibus DP Optic Link Module (OLM)	each	2		
19.2.8	3.2.5	Pressure sensors and transmitters	each	1		
19.2.9	3.2.6	Ethernet switch	each	1		
19.3	3.3	B11 pipeline				
19.3.1	3.3.1.1	220VAC/24VDC redundant power supplies	each	2		
19.3.2	3.3.1.2	Quint Diode modules	each	1		
19.3.3	3.3.1.3	Profibus DP compliant electromagnetic flow transmitter	each	1		
19.3.4	3.3.1.4	Profibus DP Optic Link Module (OLM)	each	2		

19.3.5	3.3.2	Pressure sensors and transmitters	each	1		
19.4	3.4	Pumpset 1				
19.4.1	3.4.1	Sump pump PLC	Sum			
19.4.2	3.4.2	Galvanized Kiosk	each	1		
19.4.3	3.4.3	Earthing and lightning protection	Sum			
19.4.4	3.4.4.1	220VAC/24VDC redundant power supplies	each	2		
19.4.5	3.4.4.2	Quint Diode modules	each	1		
19.4.6	3.4.4.4	Profibus DP Optic Link Module (OLM)	each	2		
19.4.7	3.4.5	Ethernet switch	each	1		
19.5	3.5	Pumpset 2				
19.5.1	3.5.1	Sump pump PLC	Sum			
19.5.2	3.5.2	Galvanized Kiosk	each	1		
19.5.3	3.5.3	Earthing and lightning protection	Sum			
19.5.4	3.5.4.1	220VAC/24VDC redundant power supplies	each	2		
19.5.5	3.5.4.2	Quint Diode modules	each	1		
19.5.6	3.5.4.4	Profibus DP Optic Link Module (OLM)	each	2		
19.5.7	3.5.5	Ethernet switch	each	1		
19.6	3.6	Pumpset 3				
19.6.1	3.6.1	Sump pump PLC	Sum			
19.6.2	3.6.2	Galvanized Kiosk	each	1		
19.6.3	3.6.3	Earthing and lightning protection	Sum			
19.6.4	3.6.4.1	220VAC/24VDC redundant power supplies	each	2		
19.6.5	3.6.4.2	Quint Diode modules	each	1		
19.6.6	3.6.4.4	Profibus DP Optic Link Module (OLM)	each	2		
19.6.7	3.6.5	Ethernet switch	each	1		
19.7	3.7	Pumpset 4				
19.7.1	3.7.1	Sump pump PLC	Sum			
19.7.2	3.7.2	Galvanized Kiosk	each	1		
19.7.3	3.7.3	Earthing and lightning protection	Sum			
19.7.4	3.7.4.1	220VAC/24VDC redundant power supplies	each	2		
19.7.5	3.7.4.2	Quint Diode modules	each	1		

19.7.6	3.7.4.4	Profibus DP Optic Link Module (OLM)	each	2		
19.7.7	3.7.5	Ethernet switch	each	1		
19.8	3.8	Pumpset 5				
19.8	3.8.1	Sump pump PLC	Sum			
19.8.1	3.8.2	Galvanized Kiosk	each	1		
19.8.2	3.8.3	Earthing and lightning protection	Sum			
19.8.3	3.8.4.1	220VAC/24VDC redundant power supplies	each	2		
19.8.4	3.8.4.2	Quint Diode modules	each	1		
19.8.5	3.8.4.4	Profibus DP Optic Link Module (OLM)	each	2		
19.8.6	3.8.5	Ethernet switch	each	1		
19.9	3.9	Pumpset 6				
19.9.1	3.9.1	Sump pump PLC	Sum			
19.9.2	3.9.2	Galvanized Kiosk	each	1		
19.9.3	3.9.3	Earthing and lightning protection	Sum			
19.9.4	3.9.4.1	220VAC/24VDC redundant power supplies	each	2		
19.9.5	3.9.4.2	Quint Diode modules	each	1		
19.9.6	3.9.4.4	Profibus DP Optic Link Module (OLM)	each	2		
19.9.7	3.9.5	Ethernet switch	each	1		
19.1	3.1	Pumpset 7				
19.10.1	3.10.1	Sump pump PLC	Sum			
19.10.2	3.10.2	Galvanized Kiosk	each	1		
19.10.3	3.10.3	Earthing and lightning protection	Sum			
19.10.4	3.10.4.1	220VAC/24VDC redundant power supplies	each	2		
19.10.5	3.10.4.2	Quint Diode modules	each	2		
19.10.6	3.10.4.4	Profibus DP Optic Link Module (OLM)	each	1		
19.10.7	3.10.5	Ethernet switch	each	1		
19.11	3.11	Common Services PLC				
19.11.1	3.11.1	Profibus DP Optic Link Module (OLM)	each	9		
19.11.2	3.11.2	9U wall mounted network cabinet	each	2		
19.12	3.12	Cabling				

19.12.1	3.12.1	Fiber Optic Cabling Infrastructure	Sum			
19.12.2	3.12.2	Ethernet CAT6 cabling infrastructure	Sum			
19.12.3	3.12.3	Multicore instrumentation cabling infrastructure	Sum			
19.12.4	3.12.4	Profibus DP cabling infrastructure	Sum			

19.13	3.13	SCADA				
19.13.1	3.13.1	Modify existing SCADA	Sum			
19.13.2	3.13.5	Other (Please specify) e.g. additional piping, joints, connectors, cable, consumables etc.				
SUB-TOTAL : AUTOMATION						

5.4.3 Appendix C – Mechanical BOQ

 DESIGN, SUPPLY, INSTALL AND PUT INTO OPERATION DRAINAGE PUMP SYSTEM AND PUMP COOLING WATER SYSTEM						
Item	Payment	Description	Unit	Qty	Rate	Amount
Refers						
No.	RW10396363/22/Mech-Refurb/Spec					
20		SCHEDULE 3 : MECHANICAL - DESIGN, MANUFACTURE SUPPLY, DELIVERY, INSTALLATION & COMMISSIONING				
20.1		Design				
20.1.1	3.1	Design of cooling water system as typical shown on drawing RA22304	Sum	1		
20.1.2	3.2	Design of drainage pump system as typical shown on drawing RA22105	Sum	1		
20.2		Manufacture, test, supply, and delivery				
20.2.1	3.1	Cooling Water System				
20.2.1.1		Removal of existing cooling water pump-sets complete with piping and fittings.	Sum	1		

20.2.1.2		Manufacture, test, supply, and delivery of complete Cooling Water electric motor pumps for pump set 1 to 7 refer to RC 01432 and Drg RA22304. Flow rate: 8ℓ/s Generated Head: 4m	Each	7		
20.2.1.3		Manufacture, test, supply, and delivery of complete Cooling Water piping including (strainers, valves, suction isolating valve, non-return valve, vent valve, delivery isolating valve, supply isolating valve and return isolating valve) to motor cooler, lubrication oil cooler and motor bearings.	Sum	1		
20.2.1.4		Supply of the Pressure gauges.	Sum	1		
20.2.1.5		Supply of the Flow meters for motor cooler.	Sum	1		
20.2.1.6		Supply of the Temperature gauges.	Sum	1		
20.2.2	3.2	Drain Pumps System				
20.2.2.1		Manufacture, test, supply, and delivery of Motor Driven Centrifugal Pumps (Refer to Rand Water document RC 1429) Flow rate: 40 ℓ/s Generated Head: 41 m	Each	7		
20.2.2.2		Manufacture, test, supply, and delivery of Non Return Valves	Each	7		
20.2.2.3		Manufacture, test, supply, and delivery of strainers	Each	7		
20.2.2.4		Construction of 600x600 mm sump refer to drawing RA 22105	Sum	1		
20.2.2.5		Manufacture, test, supply, and delivery of Isolation Valves	Each	7		

20.2.2.6		Manufacture, test, supply, and delivery of Pipeline Network complete with suction & delivery pipes and fittings(Galvanized Steel Work)Refer to drawing RA22105	Sum	1		
20.2.2.7		Manufacture, test, supply, and delivery of Basket Strainer	Each	7		
20.3		Installation, commissioning and putting into service of Equipment				
20.3.1	3.1	Cooling Water System				
20.3.1.1		Installation, commissioning and putting into service of cooling water system	Sum	1		
20.3.2	3.2	Drain Pumps System				
20.3.2.1		Installation, commissioning and putting into service of drain pumps system	Sum	1		
20.4		Maintenance during the Defects and Liability Period	Sum	1		
20.5		Training of Rand Water personnel.	Sum	1		
20.6		Preparation and submission of as built documentation including comprehensive operating and maintenance manuals	Sum	1		
20.7		All other equipment /consumables/service not stated above which are required to complete and commission the Installation				
SUB-TOTAL						

Signed by :

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Pipeline Consultant Eng

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Civil Consultant Eng

G Meraba
A-Electrical Consultant Eng

P Manana
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