

SCOPE OF WORK

FOR

**UPGRADING OF THE FILTRATION PLANT AT
BAARDSKEERDESBOS**



May 2009

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OVERSTRAND MUNICIPALITY

QUOTATION NO SC 646/2009

UPGRADING OF THE FILTRATION PLANT AT BAARDSKEERDESBOS

SCOPE OF WORK:

UPGRADING OF THE FILTRATION PLANT AT BAARDSKEERDESBOS

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STATUS

In the event of any discrepancy between a part or parts of the Standardised or Particular Specifications and the Project Specification, the Project Specification shall take precedence. In the event of a discrepancy between the Specifications, (including the Project Specifications) and the drawings and / or the Bill of Quantities, the discrepancy shall be resolved by the Engineer before the execution of the work under the relevant item.

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1.1 DESCRIPTION OF THE WORKS

Baardskeerdersbos is situated in the south-eastern part of the Overstrand Municipal Area, approximately 25 km east of Gansbaai. A locality plan of Baardskeerdersbos is provided on **Page 9**. The proposed filtration plant is located adjacent to the Boskloof Mountain Stream Weir, to the north of Baardskeerdersbos.

The present situation in Baardskeerdersbos is that the filtration plant does not have sufficient capacity to meet the existing demands of the settlement. Furthermore, the pressure differential between the existing 100 kℓ reservoir and filtration plant is insufficient to backwash the filter effectively. The upgrading of the filtration plant is required to: a) increase the capacity of the filtration plant to meet existing water demand of the settlement, and b) to reduce the operational and maintenance requirements of the filtration plant.

Quotation SC 646/2009 comprises the civil works and mechanical installations for the upgrading of the filtration plant at Baardskeerdersbos. The upgrading of the filtration plant includes the installation of additional pressure sand filters, appurtenant pipework and the construction of a filtration plant housing structure.

The works entail the supply, installation, testing, commissioning and maintaining for a period of 12 months pressure sand filters, appurtenant pipework and valves, and the filtration plant building.

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2 ENGINEERING

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2.1 DRAWINGS

The following drawings are applicable to the quotation and are issued with this tender document and will form part of the Contract Documents.

The drawings issued to tenderers as part of the tender documents must be regarded as provisional and preliminary for the tenderer's benefit to generally assess the scope of work.

The work shall be carried out in accordance with the latest available revision of the drawings approved for construction (AFC).

At commencement of the Contract, the Engineer shall deliver to the Contractor copies of the AFC drawings and any instructions required for the commencement of the works. From time to time thereafter during the progress of the works, the Engineer may issue further drawings for construction purposes as may be necessary for adequate construction, completion and defects correction of the works.

All drawings and specifications and copies thereof remain the property of the Employer, and the Contractor shall return all drawings and copies thereof to the Employer at the completion of the Contract.

Drawings are issued separately to this document and are listed below:

J00991-01-036-001-T-00	Filtration plant building
J00991-01-036-002-T-00	Typical details

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3.1 APPLICABLE STANDARDISED SPECIFICATIONS

3.1.1 Standardised Specifications

The standard specifications on which the civil works in this contract is based are **Standards South Africa's Standardized Specifications for Civil Engineering Construction SANS 1200**.

The following Sections of the Standardized Specifications of SANS 1200 shall form part of this Contract:

SANS 1200 AA	-	1986	GENERAL (SMALL WORKS)
SANS 1200 AB	-	1986	ENGINEER'S OFFICE
SANS 1200 C	-	1980	SITE CLEARANCE (As amended 1982)
SANS 1200 D	-	1988	EARTHWORKS (As amended 1990)
SANS 1200 DB	-	1989	EARTHWORKS (PIPE TRENCHES)
SANS 1200 GA	-	1982	CONCRETE (SMALL WORKS)
SANS 1200 L	-	1983	MEDIUM PRESSURE PIPELINES
SANS 1200 LB	-	1983	BEDDING (PIPES)

The following SANS specifications are also referred to in this document and the Contractor is advised to obtain them from Standards South Africa (a division of SABS) in Pretoria.

SANS 1921 (2004): Construction and Management Requirements for Works Contracts
 Part 1: General Engineering and Construction Works; and
 Part 2: Accommodation of Traffic on Public Roads Occupied by the Contractor.

OVERSTRAND MUNICIPALITY**QUOTATION NO SC 646/2009****UPGRADING OF THE FILTRATION PLANT AT BAARDSKEERDESBOS****4 PROJECT SPECIFICATIONS**

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4.1 DETAILS OF CONTRACT

The Contract comprises the civil and mechanical installations for the upgrading of the filtration plant at Baardskeerdersbos. The upgrading of the filtration plant is required to: a) increase the capacity of the filtration capacity to meet existing water demand of the settlement, and b) to reduce the operational and maintenance requirements of the filtration plant.

The Scope of Work required under this contract comprises the design (where applicable), manufacture, supply, install, test, commission and maintain for a period of 12 months :

1. Filtration plant building (refer to Particular Specification PMF).
2. Two pressure sand filters of minimum 940 mm nominal diameter each (refer to Particular Specification PMF).
3. Appurtenant pipework, isolating valves, control valves, air release valves, check valves, flow meter, pressure gauges and pipe supports (refer to Project Specification PSL and Particular Specification PMF).
4. Grouting of sand filters (refer to Particular Specification PSGA).
5. Building in of pipe specials (refer to Particular Specification PSGA).
6. Connect to existing pipelines.
7. Alteration to pipelines on the site to switch over from the existing system to the new system.

4.2 LOCALITY OF SITE AND ACCESS

Baardskeerdersbos is situated in the south-eastern part of the Overstrand Municipal Area, approximately 25 km east of Gansbaai. A locality plan of Baardskeerdersbos is provided on **Page 9**. The proposed filtration plant is located adjacent to the Boskloof Mountain Stream Weir, to the north of Baardskeerdersbos. Access to the site is via Protea Street.

4.3 CONSTRUCTION AND MANAGEMENT REQUIREMENTS

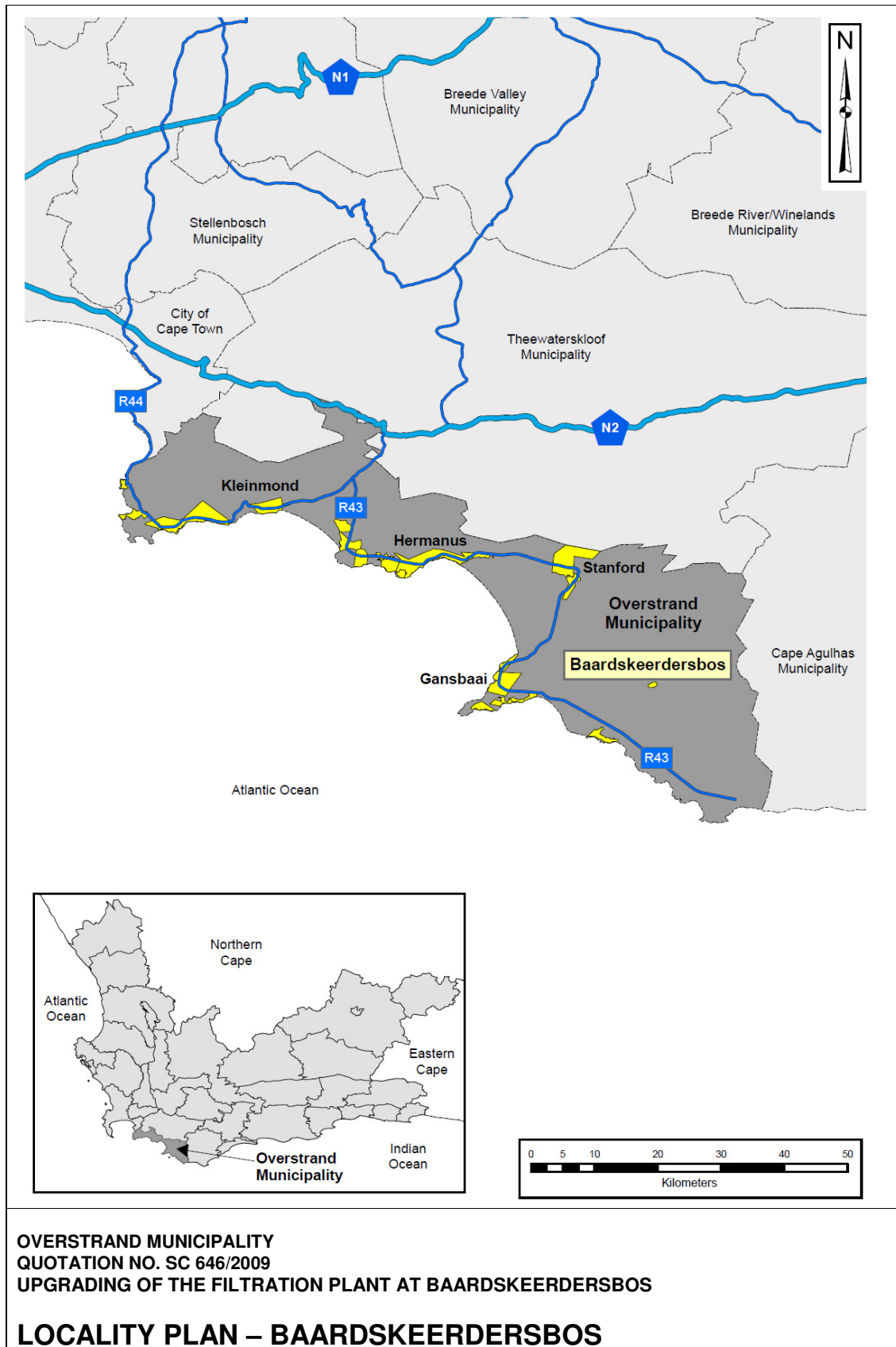
4.3.2 Quality assurance (QA) *(Read with SANS 1921 - 1 : 2004 clause 4.4)*

The Contractor will be solely responsible for the production of work that complies with the Specifications to the satisfaction of the Engineer. To this end it will be the full responsibility of the Contractor to institute an appropriate QA system on site. The Engineer will audit the Contractors QA system on a regular basis to verify that adequate independent checks and tests are being carried out and to ensure that the Contractors own control is sufficient to identify any possible quality problems which cause a delay or failure.

The Contractor shall ensure that efficient supervisory staff, the required transport, instruments, equipment and tools are available to control the quality of his own workmanship in accordance with his QA-system. His attention is drawn to the fact that it is not the duty of the Engineers representative to act as foreman or surveyor.

4.3.3 Disposal of spoil or surplus material *(Read with SANS 1921 - 1 : 2004 clause 4.10)*

The Contractor shall dispose all surplus and unsuitable material in legal spoil areas of his own choice. He shall be responsible for all arrangements necessary to obtain such spoil sites.



4.3.4 Testing *(Read with SANS 1921 – 1 : 2004 clause 4.11)*

4.3.4.1 Process control

The Contractor shall arrange for all tests required for process control to be done by a laboratory acceptable to and approved by the Engineer.

The Contractor may establish his own laboratory on site or he may employ the services of an independent commercial laboratory. Whatever method is used, the Contractor must submit the results of tests carried out on materials and workmanship when submitting work for acceptance by the Engineer. The costs for these tests shall be deemed to be included in the relevant rates and no additional payment will be made for testing as required.

4.3.4.2 Acceptance control

The process control test results submitted by the Contractor for approval of materials and workmanship may be used by the Engineer for acceptance control. However, before accepting any work, the Engineer may have further control tests carried out by a laboratory of his choice. The cost of such additional tests will be covered by a provisional sum provided in the schedule of quantities, but tests that failed to confirm compliance with the specifications, will be for the account of the Contractor.

4.3.5 Survey beacons *(Read with SANS 1921 - 1 : 2004 clause 4.15)*

The Contractor shall take special precautions to protect all permanent survey beacons or pegs such as bench-marks, stand boundary pegs and trigonometrical beacons, regardless whether such beacons or pegs were placed before or during the execution of the Contract. If any such beacons or pegs have been disturbed by the Contractor or his employees, the Contractor shall have them replaced by a registered land surveyor at his own cost.

4.3.6 Existing Services *(Read with SANS 1921 - 1 : 2004 clause 4.17)*

The Contractor shall make himself acquainted with the position of all existing services before any excavation or other work likely to affect the existing services is commenced.

The Contractor will be held responsible for any damage to known existing services caused by or arising out of his operations and any damage shall be made good at his own expense. Damage to unknown services shall be repaired as soon as possible and liability shall be determined on site when such damage should occur.

4.3.7 Management of the environment *(Read with SANS 1921 - 1 : 2004 clause 4.19)*

The Contractor shall pay special attention to the following:

(a) Natural Vegetation

The Contractor shall confine his operation to as small an area of the site as may be practical for the purpose of constructing the works.

Only those shrubs directly affected by the works and such others as the Engineer may direct in writing shall be cut down and stumped. The natural vegetation, grassing and other plants shall not be disturbed other than in areas where it is essential for the execution of the work or where directed by the Engineer.

(b) Fires

The Contractor shall comply with the statutory and local fire regulations. He shall also take all necessary precautions to prevent any fires. In the event of fire the Contractor shall take active steps to limit and extinguish the fire and shall accept full responsibility for damages and claims resulting from such fires which may have been caused by him or his employees.

4.3.8 Overhaul

No payment will be made for overhaul on this contract unless provision is made therefore in specific items.

4.3.9 Security

The Contractor shall provide security watchmen for the Contract as he deems fit at no extra cost for the Employer. The Contractor must ensure that all his employees as well as the employees of his subcontractors are able to identify themselves as members of the construction team.

4.4 CONSTRUCTION PROGRAMME**4.4.1 Preliminary programme**

The Contractor shall include a preliminary programme with his tender. The programme shall be in the form of a simplified bar chart with sufficient details to show clearly how the works will be performed within the time for completion as stated in the Contract Data.

The Contractor shall be deemed to have allowed fully in his tendered rates and prices as well as in his programme for all possible delays due to normal adverse weather conditions and special non-working days as specified in the Special Conditions of Contract, in the Project Specifications and in the Contract Data.

4.4.2 Programme in terms of Clause 12 of the General Conditions of Contract

It is essential that the construction programme conform, in all respects, to Clause 12 of the General Conditions of Contract. The preliminary programme to be submitted with the tender shall be used as basis for this programme.

The Contractor is required to complete the works related to this contract before 30 June 2009. The construction programme submitted with the quotation should indicate the measures taken by the Contractor to reach practical completion of the works by this date.

The programme shall be in the form of a Bar Chart (Gantt) or other time/activity form acceptable to the Engineer. The unit of measurement in respect of the time periods of activities will be a man day. The programme shall reflect at least the following information:

- The proposed rate of progress in order to complete the Works before 30 June 2009, showing the various activities, their durations and proposed resource levels (major plant and labour) for each element of the Works. Sufficient detail shall be provided to enable the Engineer to gauge construction progress. All activities, including establishment on site, trimming and finishing, local authority clearance, and the completion of all minor ancillary works are to be included in the programme.
- Sequence of activities and any dependencies (time or resource related) between them.
- Critical path activities.
- Key dates in respect of work to be carried out, or information, etc. required and to be provided, by others.
- Time allowed for local authority clearance of new services.
- Other information specifically required by the Engineer.

When drawing up his programme, the Contractor shall, inter alia, take into consideration and make allowance for:

- Expected weather conditions and their effects.
- Known physical conditions and artificial obstructions.
- Dealing with, altering and installing services.
- All other actions required in terms of this contract

The following details shall also accompany the programme:

- Proposed number of working hours per day, working days per week, "pay weekends" if any, and any proposed holiday or other shut down periods.
- Schedule of proposed labour resources (giving a breakdown of engineers/technicians, foremen, supervisors, artisans, skilled and unskilled labour) for each major activity.
- Schedule of proposed plant resources (giving a breakdown of description, number of units, make/model/type) for each major activity.
- The rate of production (units per day/hour) on which the programmed time for carrying out the work is based for the following activities:
 - Construction of a filtration plant building.
 - Supply, install, test and commission two pressure sand filters.
 - Supply, install, test and commission isolating valves, control valves, air release valves, flow meter, pressure gauges and pipe supports.
 - Grouting of pressure filter units onto floor slab.
 - Supply, install, test, commission pipe specials.
 - Alteration to pipelines on the site to switch over to the proposed filtration plant.
 - Commissioning of the proposed filtration plant.

It is in the Contractor's interest to give as much information as possible about times allowed for construction as well as resource or other limitations on programme times, since this programme will form the basis for any contractual negotiations about grounds for extension of time once the contract is commenced. Failure to comply with any of these requirements entitles the Engineer to use a programme based on his own assumptions to evaluate claims for extension of time for the completion of the work and/or for additional compensation.

Once approved by the Engineer in writing, this programme shall be known as the "approved programme". Should the Contractor intend any programme changes, the Engineer will be given ten days written notice thereof. Minor revisions to the contract programme may be introduced from time to time by mutual agreement between the parties. Such revisions shall be done in writing. Should the Engineer require a major revision to the contract programme for whatever reason, the Contractor shall be notified in writing and such revision shall be submitted for approval to the Engineer within two weeks of receipt of such notification.

Once a week the Contractor shall submit to the Engineer an extract from the updated contract programme covering the forthcoming two-week period with major activities broken down into daily activities.

No separate payment will be made for observing these requirements as they are deemed to be included in the amounts tendered for the items covering the Contractor's Contractual Obligations.

4.4.3 Extension of time resulting from abnormal climatic conditions

The Contractor shall make allowance in his tendered rates, prices and programme for the normal rainfall and adverse weather conditions that may be expected during the Contract period. All necessary steps shall be taken to proceed with the Works despite inclement weather. The Contractor shall however record all inclement weather conditions which adversely affect the works.

During the execution of the works, the Engineer will certify a day lost due to adverse weather conditions only if:

- no work was possible on the relevant working day on any item which is on the critical path according to the latest approved construction programme; or
- if less than 30% of the work force and plant on site could work during that specific working day.

The onus shall be on the Contractor to verify his claim regarding the amount of resources involved. The Contractor will have to satisfy the following prerequisites:

- Record in writing to the Engineer
- Agree with the Engineer the physical conditions encountered due to adverse weather at the time of occurrence
- Identify the critical construction activity affected.

Extension of time as a result of abnormal rainfall and adverse weather conditions shall be calculated monthly being equal to the number of working days certified by the Engineer's representative as lost due to rainfall and adverse weather conditions. The total extension of time as a result of abnormal climatic conditions for which the Contractor may apply, shall be the cumulative algebraic sum of the monthly extensions.

4.5 SITE FACILITIES AVAILABLE

4.5.1 Contractor's camp site and depot *(Read with SANS 1921 - 1 : 2004 clause 4.14)*

The site for the Contractor's camp will be agreed upon with the Employer. A security fence around the construction camp is the responsibility of the Contractor. The layout of the construction camp site shall be submitted to the Engineer for his approval before the Contractor starts erecting his camp.

4.5.2 Accommodation of Employees

No employees except for security guards will be allowed to sleep or be accommodated on the site. No accommodation is available for the Contractor's and/or sub-contractor's employees and the Contractor shall make his own arrangements to house his employees and to transport them to site.

The Contractor shall provide the necessary ablution facilities at his camp site and the site of the works for the use of his employees. Chemical toilets only will be allowed where temporary facilities have to be provided.

4.5.3 Power supply, water and other services

Water will be supplied to the Contractor free of charge by the Employer. Electricity is available on site, however, the Contractor shall make his own arrangements concerning the supply of electrical power and all other services with the relevant authorities. No direct payment will be made for the provision of electricity and other services. The cost thereof shall be deemed to be included in the rates and amounts tendered for the various items of work for which these services are required, or in the Contractor's preliminary and general items as the case may be.

4.6 FEATURES REQUIRING SPECIAL ATTENTION

4.6.1 Finishing and trimming

Progressive and systematic finishing and trimming will form an essential part of this contract. Under no circumstances shall spoil, rubble, materials, equipment or unfinished operations be allowed to accumulate unnecessarily and in the event of this occurring, the Engineer shall have the right to withhold payment.

4.6.2 "As built" drawings

The Contractor shall, as the work progresses, keep a complete record of the works he has constructed and of existing services that were encountered during construction (the "As Built" record). All deviations from and additions to the construction drawings issued by the Engineer shall be marked in red ink on the drawings issued to the Contractor for this purpose and the true positions, invert levels and ground levels of all services shall be indicated on the drawings.

The Contractor shall keep the "As Built" record up to date on a monthly basis and submit the record together with the progress payment certificate for approval by the Engineer.

The completion certificate shall only be issued after the Engineer has received a properly completed set of "As Built" drawings from the Contractor. No additional payment shall be made for producing the "As Built" drawings and all the relevant costs shall be deemed to be covered by the tendered rates.

4.7 OCCUPATIONAL HEALTH AND SAFETY *(Read with SANS 1921 - 1: 2004 clause 4.14)*

4.7.1 General statement

It is a requirement of this contract that the Contractor shall provide a safe and healthy working environment and to direct all his activities in such a manner that his employees and any other persons, who may be directly affected by his activities, are not exposed to hazards to their health and safety. To this end the Contractor shall assume full responsibility to conform to all the provisions of the Occupational Health and Safety Act (OHSA) No 85 and Amendment Act No 181 of 1993, and the Construction Regulations 2003 issued on 18 July 2003 by the Department of Labour.

For the purpose of this contract the Contractor is required to confirm his status as mandatory and employer in his own right for the execution of the contract by entering into an agreement with the Employer in terms of the Occupational Health and Safety Act.

4.7.2 Health and Safety Specifications and Plans to be submitted at tender stage

(a) Tenderer's Health and Safety Plan

The successful Tenderer shall, on receipt of notification that he has been awarded the contract, submit without delay his own documented Health and Safety Plan for the execution of the work under the contract. His Health and Safety Plan must at least cover the following:

- (i) a proper risk assessment of the works, risk items, work methods and procedures in terms of Regulations 7 to 28;
- (ii) pro-active identification of potential hazards and unsafe working conditions;
- (iii) provision of a safe working environment and equipment;
- (iv) statements of methods to ensure the health and safety of subcontractors, employees and visitors to the site, including safety training in hazards and risk areas (*Regulation 5*);
- (v) monitoring health and safety on the site of works on a regular basis, and keeping of records and registers as provided for in the Construction Regulations;
- (vi) details of the Construction Supervisor, the Construction Safety Officers and other competent persons he intends to appoint for the construction works in terms of Regulation 6 and other applicable regulations; and
- (vii) details of methods to ensure that his Health and Safety Plan is carried out effectively in accordance with the Construction Regulations 2003.

The Contractor's Health and Safety Plan will be subject to approval by the Employer, or amendment if necessary, before commencement of construction work. The Contractor will not be allowed to commence work, or his work will be suspended if he had already commenced work, before he has obtained the Employer's written approval of his Health and Safety Plan.

Time lost due to delayed commencement or suspension of the work as a result of the Contractor's failure to obtain approval for his safety plan, shall not be used as a reason to claim for extension of time or standing time and related costs

4.7.3 Cost of compliance with the OHS Construction Regulations

The rates and prices tendered by the Contractor shall be deemed to include all costs for conforming to the requirements of the Act, the Construction Regulations and the Employer's Health and Safety Specification as applicable to this contract. Should the Contractor fail to comply with the provisions of the Construction Regulations, he will be liable for penalties as provided in the Construction Regulations and in the Employer's Health and Safety Specification.

Items that may qualify for remuneration will be specified in the Safety Specifications included or in the Project specifications.

4.8 AMENDMENTS TO STANDARD AND PARTICULAR SPECIFICATIONS

In certain clauses the standard, standardised and particular specifications allow a choice to be specified in the project specifications between alternative materials or methods of construction and for additional requirements to be specified to suit a particular Contract. Details of such alternative or additional requirements applicable to this Contract are contained in this part of the project specifications. It also contains additional specifications required for this particular Contract.

The number of each clause and each payment item in this part of the project specifications consists of the prefix PS followed by a number corresponding to the number of the relevant clause or payment item in the standard specifications. The number of a new clause or payment item, which does not form part of a clause or a payment item in the standard specifications and is included here, is also prefixed by PS followed by a new number. The new numbers follow on the last clause or item number used in the relevant section of the standard specifications.

Should any requirement of any part of the Project Specification be in conflict with any requirement of the Standardised or Particular Specifications the requirement of the Project Specification shall prevail.

PSAA GENERAL (SMALL WORKS)**PSAA-2 INTERPRETATIONS****PSAA-2.8 ITEMS IN SCHEDULE OF QUANTITIES****PSAA-2.8.1 Principle**

In the fourth line of Subclause 2.8.1 after the word "specification", add "or particular specification".

Add the following:

"The descriptions under the pay items in the various sections of the specifications, indicating the work for which allowance shall be made in the tendered rates for such pay items, are for the guidance of the contractor and do not necessarily repeat all the details of work and materials required by and described in the specifications."

PSAA-3 MATERIALS**PSAA-3.1 QUALITY**

Add the following:

"All materials that are required to comply with a standard specification shall, where applicable, bear the official mark of the appropriate standard. All alternative materials proposed by the Contractor shall be tested for acceptability by the Contractor and the results of the tests made available to the Engineer. All such materials then require the approval of the Engineer. The costs of the tests shall be borne by the Contractor. The Engineer's approval is required of any manufacturer's published instructions prior to their use by the Contractor.

The Contractor shall submit to the Engineer samples of all materials to be used in the works and which are to be supplied by the Contractor for the approval of the Engineer prior to their incorporation into the work. If approved, the samples so submitted will be kept by the Engineer as standards for the duration of the Contract. No materials inferior in quality, workmanship or appearance to the approved samples shall be used."

PSAA-4 PLANT**PSAA-4.2 CONTRACTOR'S OFFICE, STORES AND SERVICES**

Add the following:

"It is not a requirement of this Contract for the Contractor to provide an approved field laboratory on site, although he may elect to do so. If no laboratory is provided, the Contractor shall nevertheless arrange to have the required quality control tests performed by an approved commercial laboratory, and his tendered rates shall include full compensation for such tests."

Add the following subclause:

"PSAA-4.3 RESTRICTION ON EMPLOYEE ACCOMMODATION

No housing is available for the Contractor's employees and the Contractor shall make his own arrangements to house his employees and to transport them to site."

PSAA-5 CONSTRUCTION**PSAA-5.4 SAFETY**

Add the following :

“The Contractor shall comply with the Occupational Health and Safety Act (Act No. 85 of 1993) as amplified by The Construction Regulations, 2003.

All the work included in this contract shall, for the purpose of complying with the Occupational Health and Safety Act and the Construction Regulations, be deemed to be construction work.”

Add the following clause :

“PSAA-5.6 WORKMANSHIP

The onus rests on the Contractor to produce work which will conform in quality and accuracy of detail to the requirements of the Specifications and Drawings, and the Contractor must, at his own expense, institute a quality control system and provide experienced technical staff together with all transport, instruments and equipment to ensure adequate supervision and positive control of the works at all times.”

PSAA-8.5 PROVISIONAL SUMS, PRIME COST ITEMS, DAYWORKS AND TEMPORARY WORKS**PSAA-8.5.1 For work to be executed by the Employer**

Add the following sub-items:

“a) Acceptance control testing:

i) Testing by approved commercial laboratory Unit : Provisional Sum

A provisional sum is provided for additional tests ordered by the Engineer for Acceptance control testing. This provisional sum shall cover the cost of tests specifically ordered by the Engineer in his discretion and executed by an approved commercial laboratory, but will not include any tests, which form part of the Contractor's Process quality control scheme.

ii) Overheads, charges and profit for the Contractor Unit : %

b) Checking of As-Built information

i) Checking by independent surveyor Unit : Provisional Sum

A provisional sum is provided for checking of As-Built information by an independent surveyor ordered by the Engineer.

ii) Overheads, charges and profit for the Contractor Unit : %”

PSAA-8.5.3 Dealing with water.....Unit: Sum

The sum shall cover all costs of dealing with surface and ground water for the proper execution of the works for the duration of the contract.

Add the following clauses :

“PSAA-8.7

DAYWORK

“Day work will be paid according to the percentage allowance method. For calculating the total remuneration the General Conditions of Contract for Construction Works (2004), shall apply, with the amendments as in the appropriate special conditions of contract that is bound into this document. A day work schedule will be provided for filling in the necessary information. A working day will consist of 9.25 hours per day only.

PSAB ENGINEER'S OFFICE**PSAB-3 MATERIALS****PSAB-3.1 NAMEBOARDS**

No nameboards are required for the contract.

PSAB-3.2 OFFICE BUILDING(S)

No offices are required for the Engineer's Representative.

PSAB-4 PLANT**PSAB-4.1 TELEPHONE**

The Contractor's site agent or representative must be contactable at all times by phone. Should use be made of radio and/or cellular-phone, these must be operational at all times with sufficient back-up batteries or recharging facilities.

A telephone for the Engineer's Representative is not required. The Engineer shall make use of his or her personal cellular phone to perform his duties with regards to the contract.

Add the following subclause:

"PSAB-4.2 SURVEY EQUIPMENT

The Contractor shall provide the following survey equipment on site for the full duration of the Contract:

- a) 1 automatic level and levelling staff, with tripod;
- b) 1 steel measuring tape of length 50 m.

All equipment may be shared by arrangement between the Contractor and the Engineer's Representative. The Contractor shall insure the equipment against any loss, damage or theft and he shall indemnify the Engineer against any claims in this regard.

The Contractor shall maintain the equipment in good working order and keep it clean throughout the contract period."

PSAB-5 CONSTRUCTION**PSAB-5.1 NAMEBOARDS**

Add the following:

"The Contractor will be permitted to erect a maximum of two of his own name boards, in positions approved by the Engineer. The Engineer reserves the right to order the removal of these boards if they are not kept in good repair."

PSAB-5.3 KEY PERSONNEL

Add the following:

"The required key personnel from the Contractor has to be discussed and agreed with the Employer and Engineer before pricing the Tender. Furthermore, the Contractor shall inform the Engineer of the person to whom he has assigned duties with respect to the site in terms of the Occupational Health and Safety Act and the person(s) who are in possession of a valid certificate of competency in first aid. The Contractor shall give copies of the minutes of the site safety meeting to the Engineer."

PSAB-5.5 SURVEY ASSISTANTS

Add the following:

"A suitably qualified survey assistant shall be allocated to the Engineer by the Contractor. The survey assistant shall be available to the Engineers as assistant at all reasonable times during the construction period."

Add the following clause :

"PSAB-5.6 SITE INSTRUCTION BOOK

Throughout the construction period the Contractor shall supply a carbon quadruplicate book as a site instruction book.

This book shall be kept on site and shall be accessible to both the Contractor and the Engineer at all times. It shall be used:

- a) by the Contractor for providing the Engineer with any information regarding the construction of the Works which may be requested, and giving notification in writing of inspections, drawings, etc, required by the Contractor, and
- b) by the Engineer for the purpose of writing day-to-day instructions and confirming any verbal information or instructions given to the Contractor.

One copy of each site note issued shall remain in the book."

PSAB-8 MEASUREMENT AND PAYMENT**PSAB-8.2 PAYMENT**

Add the following clause:

"PSAB-8.2.2 Key personnel, survey assistants, survey equipment, site instruction book, etc

No payment will be made in respect of the above-mentioned, and all the costs concerned will be deemed to be covered by the rates tendered for the Contractor's facilities."

PSD EARTHWORKS**PSD-3 MATERIALS****PSD-3.3 SELECTION****PSD-3.3.1 General**

Substitute the second paragraph with the following:

“The Contractor shall deal with materials from pipe trench excavations in such a way as to ensure that usable material is not contaminated with unsuitable material. If usable material is contaminated, such contaminated material shall be removed and replaced with suitable material at the Contractor’s expense. No additional payment shall be made in respect of this and all relevant costs shall be deemed to be included in the tendered rates.

All unsuitable material shall be removed prior to importing fill material to such areas.”

PSD-5 CONSTRUCTION**PSD-5.1 PRECAUTIONS****PSD-5.1.1 Safety****PSD-5.1.1.2 Safeguarding of excavations**

Add the following subparagraph:

“(g) The Contractor or his agent or his representative shall not require or allow any person to work under unsupported overhanging material or in an excavation which is more than 1,5 m deep, and any excavation which has not been adequately supported or braced if there is a danger of the overhanging material or the sides of the excavation collapsing. The support, shoring or bracing to be designed and constructed by the Contractor, shall be strong and sturdy enough to support the sides of the excavation in question.”

PSD-5.1.2 Existing Services**PSD-5.1.2.2 Detection, location and exposure**

Add the following:

“If existing services are not shown on the drawings but the existence thereof can be reasonably expected, the Contractor shall, in conjunction with all relevant authorities, determine the exact depth and location of such services before the commencement of construction. After locating the exact position of services, whether indicated on the drawings or not, such services shall be deemed to be known services and the Contractor shall be liable for all costs and subsequent costs arising from the damage thereof as a result of the Contractor’s activities. These services must also be indicated on the “As Built” drawings.”

PSD-5.1.4 Nuisance**PSD-5.1.4.1 Dust nuisance**

Add the following :

“The Contractor is responsible for dust control and is liable for all claims that may result from dust nuisance on all parts of the site and at all times from the date of handing over of the site to the completion date of the contract. No payment regarding the above-mentioned will be made and all costs shall be deemed to be covered by the tendered rates.”

PSD-5.2 METHODS AND PROCEDURES**PSD-5.2.2 Excavation****PSD-5.2.2.3 Disposal**

Add the following:

"The Contractor shall make his own arrangements for a spoil site for surplus and unsuitable material. All costs related to the disposal of surplus material shall be deemed to be included in the tendered rates."

PSD-8 MEASUREMENT AND PAYMENT**PSD-8.3 SCHEDULED ITEMS****PSD-8.3.8 Existing Services****PSD-8.3.8.1 Location****PSD-8.3.8.1c) Excavate by hand in soft material to expose existing service..... Unit : m³**

Add the following :

"Excavation by hand to expose existing services shall only be measured and paid for if so ordered in writing by the Engineer. After the excavation of trial holes to determine the exact position and depth of existing services, at intervals as required by the Engineer, the excavation to a level of 300 mm above such service shall be measured and paid for as normal excavation, independent of the depth of such excavation. Only excavation within 300 mm of the existing service will be measured and paid for as excavation by hand and then only if ordered in writing by the Engineer."

PSDB EARTHWORKS (PIPE TRENCHES)**PSDB-3 MATERIALS****PSDB-3.5 BACKFILL MATERIAL**

Add the following:

"All pipe trenches underneath the roadway must be backfilled with sand of upper selected layer quality compacted to 100% of the modified AASHTO maximum density. Sand is defined as non-plastic material and complies with the following sieve analysis;

% passing 4.740 mm sieve - 95% minimum
 0.425 mm sieve - 50% minimum
 0.075 mm sieve - 10% maximum"

PSDB-3.6 MATERIALS FOR REINSTATEMENT OF ROADS AND PAVED AREAS**PSDB-3.6.1 Subbase and Base**

Substitute the clause with the following:

"Where pipe trenches cross or run adjacent to surfaced roads and paved areas of which the surface are scheduled to be reinstated, the material excavated from the existing base and / or subbase pavement layer(s) shall be set aside and used in the reconstruction of the subbase layer. Where applicable, new material complying with the requirements of SANS 1200 MF shall be used for the reconstruction of the base layer. Any shortfall in material for the reconstruction of the subbase layer shall be made up by the use of material complying with the requirements of SANS 1200 ME."

PSDB-4 PLANT**PSDB-4.1 EXCAVATION EQUIPMENT**

Add the following:

"All excavations exceeding the specified widths, shall be backfilled with approved selected material. No payment shall be made for this and all relevant costs shall be deemed to be included in the tendered rates."

PSDB-5 CONSTRUCTION**PSDB-5.1 PRECAUTIONS****PSDB-5.1.3 Accommodation of Traffic and Access to Properties**

Add the following :

"The maximum length of trench that may be open (not completely backfilled) at any stage is 100 m. The Contractor shall ensure that trenches are safe in terms of access by the public at all times but especially at night."

Add the following subclause:

"PSDB-5.1.5 Trench Excavations

The precautions for excavations as specified in Clause 5.1.1 of Section 1200 D, 1200 DA, and the relevant clauses in PSD and PSDA, shall also apply to all trench excavations.

The Contractor shall take all the steps necessary to ensure that no person is required or allowed to work in a trench or any other unsupported overhanging excavation which is more than 1,5 m deep, and any excavation which has not been adequately supported, shored or braced if there is any danger whatsoever of the sides of the excavation collapsing. The support, shoring or bracing to be designed and constructed by the Contractor, shall be strong and sturdy enough to support the sides of the excavation in question."

PSDB-5.2 MINIMUM BASE WIDTHS

Add the following:

"The applicable minimum base width for water mains is 750 mm."

PSDB-5.4 EXCAVATION

Add the following :

"Excavation and backfill of pipe trenches shall be done in such a way as to ensure the least possible disruption to entrances to properties. No additional payment shall be made for this and all relevant costs shall be deemed to be included in the tendered rates."

PSDB-5.5 TRENCH BOTTOM

Substitute "90%" in the second paragraph with "93% (100% for sand)".

Add the following:

"Should the Contractor, after having complied with all the requirements of Subclause 5.1.2 regarding de-watering of excavations, find that the conditions in the trench bottom remain unstable due to the nature of the soil and the degree of saturation, he shall advise the Engineer who may order the Contractor to place a specified layer thickness of 13 mm crushed stone on the trench bottom in order to produce a more stable trench bottom."

PSDB-5.6 BACKFILLING

PSDB-5.6.3 Disposal of Soft Excavation Material

Add the following:

"All surplus and unsuitable material as described in Clause DB 5.6.3 shall be disposed of to a spoil site and levelled off."

PSDB-5.7 COMPACTION

Add the following:

"Sand backfilling shall be compacted to 100% modified AASHTO maximum density."

PSDB-7 TESTING

PSDB-7.1 Replace this subclause with the following:

"As part of his process control the Contractor shall be responsible for all tests on the backfilling of pipe trenches. Testing shall be carried out at not less than the following frequencies:

One test for every layer of backfill for road crossings, and one test for every layer of backfill for every 100 metre length of trench elsewhere."

PSDB-8 MEASUREMENT AND PAYMENT**PSDB-8.3 SCHEDULED ITEMS****PSDB-8.3.2 Excavation****PSDB-8.3.2 a) Excavate in all materials for trenches, backfill, compact..... Unit : m or m³ and dispose of surplus material**

Add the following:

"In cases where services lie parallel to steep slopes, the depth of the excavation will be measured along the centre of the trench (on the route of the service).

The rate shall also provide for the fact that the excavation width in sand will be wider than normal and that fast excavation and backfill will reduce ground water seepage.

The rates are to allow for excavation in the classes of material as referred to in Clause 3.1.2 of SANS 1200D as well as excavation and disposal of unsuitable material from the trench bottom.

There will be no extra-over payment in terms of boulder excavation, but only for intermediate or hard-rock excavation."

Add the following clause:

PSDB-8.3.3.4 Overhaul.....Unit : m³

Amend the clause as follows :

"No distinction shall be made between limited and long overhaul and the rate shall cover the cost of transporting surplus or unsuitable material to an off-site spoil site of the Contractor's choice."

PSDB-8.3.5 Existing Services that Intersect or Adjoin a Pipe Trench**PSDB-8.3.5a) Services that intersect a trench Unit : No**

Add the following:

"Existing services with a depth of cover exceeding 300 mm, measured from the bottom of excavation to the top of the existing service shall not be measured and paid for. The rate shall also allow for the following costs:

- i) Sufficient photo's have to be taken of existing services and handed over to the Engineer before the crossing thereof. If there is a possibility of difference of opinion concerning the condition of those services, especially on private property, the photos shall be scrutinized to obtain a verdict.
- ii) If such a service is damaged, it has to be repaired to its original condition or if possible, to a standard agreed to in writing with the relevant owner. This agreement has to be approved by the Engineer.
- iii) If such a service is removed, it has to be replaced as per original."

PSDB-8.3.5b) Services that adjoin a trench Unit : m

Add "No" to the Unit of measurement.

Add the following:

"The unit "number" will only be used for services such as poles and trees.

Existing fences will be treated as "services" and allowance is made for this in the schedule of quantities.

No payment will be made for overhead services that do not rest directly on the ground except where allowance is made for this in the schedule of quantities.

Existing services that rest directly on the ground e.g. poles, trees, walls and structures are dealt with in the same way as underground services, but the axis of the service will be determined as follows:

The vertical axis is defined as the nearest side or corner of the existing structure to the excavation, measured at the point where the structure and natural ground level intersect.

The horizontal axis will be at the point where the structure and the natural ground level intersects. In this instance, where the excavation falls above the 45° line but within 1 meter horizontally from the structure, the service will also be measured as adjoining.

If the structure, according to the abovementioned, does not qualify as an adjoining service but the foundation of the structure is such that if a 45° line drawn from the nearest bottom corner thereof cuts through the excavation, the structure will be measured as an adjoining service **if approved by the Engineer.**

There will be distinguished between trunk services and existing erf connection."

PSGA CONCRETE (SMALL WORKS)**PSGA-3 MATERIALS****PSGA-3.2 CEMENT****PSGA-3.2.1 Applicable Specifications**

Add the following at the end of this clause:

"The standard cement and extenders specifications applicable to the contract are as follows:

SANS 50197-1	:	Cement Part 1: Composition, specifications and conformity criteria for common cements
SANS 50197-2	:	Cement Part 2: Conformity evaluation
SANS 1491-1	:	Portland Cement Extenders Part 1: Ground granulated blast-furnace slag
SANS 1491-2	:	Portland Cement Extenders Part 2: Fly ash
SANS 1491-3	:	Portland Cement Extenders Part 3: Silica fume
SANS 50413	:	Masonry cement"

PSGA-3.4 AGGREGATES**PSGA-3.4.1 Applicable Specifications**

Add the following:

"Both course and fine aggregates shall be free from any organic material. Course aggregate shall be 19 mm stone. Fine aggregate may be obtained from local sources subject to testing of its suitability by an approved laboratory and approval by the Engineer.

At tender 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 shall be responsible for locating the sources of all aggregates."

PSGA-3.4.2 Use of Plums

The use of plums shall not be permitted.

PSGA-4 PLANT**PSGA-4.2 MIXING PLANT**

Add the following:

"The size and siting of the mixing plant shall be subject to the approval of the Engineer."

PSGA-4.3 VIBRATORS

Add the following:

"All concrete shall be compacted by vibrators."

PSGA-5 CONSTRUCTION**PSGA-5.1 REINFORCEMENT****PSGA-5.1.2 Fixing**

Add the following :

“No welding of reinforcement will be permitted.”

PSGA-5.1.3 Cover

Replace the contents of this clause with the following:

“The minimum concrete cover to all reinforcement shall be 50 mm unless otherwise noted on the drawings.

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. 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.”

PSGA-5.2 FORMWORK**PSGA-5.2.1 Classification of Finishes**

Add the following:

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

PSGA-5.4.1.5 Strength concrete

Add the following:

“Unless otherwise stated, the grades of concrete shall be as follows:

- a) Structural concrete shall be 35 MPa/19 mm concrete with the minimum combined cement contents including extenders of 420 kg/m³ and with Xypex Admix C-500NF admixture at a dosage rate of 1.5 % by weight of the cementitious content including extenders. A blend of 50 % CEM I 42,5N (Ordinary Portland Cement) and 50 % Ground Granulated Blastfurnace Slag (GGBS) shall be used for structures and valve chambers on this contract. The maximum ratio of water to cementitious material shall be 0,45. If aggregates to be used in this Contract are alkali-reactive, the cement used on this Contract shall not have an alkali content (Na₂O + 0,658 K₂O) which exceeds 0,6 % by mass of the cement. The total alkali content of the concrete shall not exceed 2,1 kg/m³ for aggregates falling in the rapidly expanding group (e.g. Malmesbury Group Metasediments) or 2,8 kg/m³ for Cape Granite. The Contractor shall submit the necessary test results to prove the above.
- b) Benching shall be 20 MPa/19 mm concrete.

- c) Screeds shall be 20 MPa/13 mm concrete.
- d) Mass concrete, concrete encasement of pipes, thrust blocks and blinding layers shall be 15 MPa/19 mm concrete.
- e) No fines concrete shall be 25 MPa/19 mm concrete, cement and water only cast to the profile depth in one pour.
- f) Screeds shall be 50 mm average (min 25 mm) screed class II mortar with Sikacem 810 admixture (or similar approved) to supplier's specification."

PSGA-5.4.1.6 Ready-mixed concrete

Add the following:

"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 GA and Clause PSGA-7.1.2.

Ready-mixed concrete shall only be acceptable for incorporation into the works if supplied from commercial sources complying with the following criteria:

The batching plant supplying the ready-mix concrete for the contract shall be either:

- a) a SARMA member in good standing, which has been previously evaluated by means of:
 - i) a 'SHE' audit and attained a minimum of a 'Four Ghekkos rating (81% to 91%)' for the plant; and
 - ii) a technical audit and attained a rating of at least 95%; or
- b) ISO 9001:2000 compliant.

Where a commercial ready-mix supplier is commissioned to supply concrete, the contractor shall submit documented proof, to the satisfaction of the Engineer, to prove compliance with the above requirements."

PSGA-5.4.7 Curing and Protection

Replace this sub-clauses a, b and c with the following:

- "a) Floor and roof slabs and wall footings

Floors and roof slabs and wall footings shall be flooded with water, the depth of which shall not exceed 75 mm, and shall not be less than 25 mm. Alternatively, these elements shall be covered with a layer of clean river sand, 20 mm to 25 mm thick, which shall be kept moist by means of an irrigation type mist spraying system as specified below.

The sand or water shall be applied after the specified surface finishing has been completed and the concrete has gained sufficient strength to prevent any damage to the surface, but not more than 24 hours after the concrete has been cast. If the concrete is exposed to thermal shocks like high temperatures and/or dry, warm winds before the water or sand can be applied, the concrete shall be protected with approved plastic sheets that comply with the requirements as specified below until the concrete surface can be covered.

b) Walls

Both sides of walls shall be kept moist by means of an irrigation type mist spraying system as specified below. Sprayers shall be spaced at such intervals to ensure that the whole concrete face is wetted. Curing shall commence the day after concrete has been cast and shall continue for at least 10 days. If formwork is to remain in position (e.g. to support subsequent lifts), it shall be loosened as soon as the concrete has gained sufficient strength (usually within a day) to allow curing water to thoroughly wet the surfaces of the concrete.

c) 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. All associated costs for curing and protection shall be allowed for in the tendered rates and prices.

d) 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.

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) Duration of curing

The curing period shall be at least 10 days.

g) 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."

PSGA-5.4.9 Watertight Concrete

Add the following:

"All reinforced concrete structures shall be regarded as water-retaining structures."

Add the following new clauses:

“PSGA-5.4.11 Construction Joints

The method adopted for forming joints in water-retaining structures shall be as follows:

Depending on the weather conditions, the surface of the concrete at wall/floor joint shall be sprayed with a high pressure water jet within 24 hours of casting to remove all laitance and fine particles to a depth of at least 10 mm and to expose the coarse aggregate embedded in sound concrete. The Contractor shall ensure that the green concrete is not damaged or disturbed during the preparation of the joint.

After the reinforcement for the next pour has been fixed and the formwork erected, the construction joint shall be cleaned thoroughly with a pressurised water jet. The joint shall then be wetted continuously with water for 24 hours to completely saturate the concrete immediately before new concrete is cast. Before the new concrete is cast all excess water shall be removed from the construction joint. Before casting, a slurry coat of Xypex Concentrate of maximum 1.25 mm thick shall be applied to the prepared concrete face, and the new concrete cast directly onto it.

For concrete already cast, the entire contact surface along the joint shall be chipped or water jetted to expose the coarse aggregate to 5 mm beyond the surrounding matrix. Care shall be taken to ensure that the concrete structure is not damaged and that all loose material is removed. The surface must be thoroughly cleaned and wetted prior to the casting of the new concrete against the joint.

PSGA-5.5 Pipes and Conduits

The building in of items such as puddle pipes shall be executed by direct casting.

PSGA-8: MEASUREMENT AND PAYMENT

PSGA-8.1 MEASUREMENT AND RATES

PSGA-8.1.2 Reinforcement

Replace subclause 8.1.2.2 with the following:

“PSGA-8.1.2.2 Mild steel and high tensile steel will be measured by mass for the diameters or range of diameters as scheduled.

Welded mesh will be scheduled separately for each type and mass per square metre of mesh.”

Replace subclause 8.1.2.3 with the following:

“PSGA-8.1.2.3 The unit rate for steel bars shall cover the cost of supply, cutting, bending, placing in position, and fixing of the reinforcing and supporting steel scheduled. The rate shall also include the provision of all spacer devices and binding wire, as well as the cost of tests in terms of SANS 920.

The unit rate for welded mesh shall cover the supply, cutting and placing of mesh, as well as the cost of all waste due to laps.”

PSL MEDIUM PRESSURE PIPELINES**PSL-2 INTERPRETATIONS****PSL-2.4 ABBREVIATIONS**

Add the following:

"HDPE	- High Density Polyethylene
DI	- Ductile Iron
BS	- British Standards
EN	- European Standards
ISO	- International Standards"

PSL-3 MATERIALS**PSL-3.1 GENERAL**

Substitute the first sentence with the following:

"All uPVC pipes including bends, reducers, T-pieces, socketed flange adaptors, etc. shall be uPVC Class 16 to SANS 966 and have a minimum working pressure of 16 bar. All bends for uPVC shall be uPVC bends to SANS 966 and have a minimum working pressure of 16 bar. All reducers, T-pieces, couplings and other fittings for uPVC pipe shall be ductile iron (spheroidal graphite (SG) iron) complying with the requirements of EN 12842 and have a minimum working pressure of 16 bar.

All steel pipes, pipe specials, bends, reducers, T-pieces, couplings and other fittings shall be mild steel.

The materials and construction of all pipes, fittings, valves and specials shall comply with the appropriate SABS Specification whether stated or not and shall be approved by the Engineer. Cut pipes shall only be used at pipe junctions to position valves and specials as shown on the drawings, and at connections to structures. When laying the pipes the markings shall be visible from above."

Add the following:

"The Contractor shall provide adequate storage facilities for pipes, couplings and specials to conform to the following:

(a) Couplings and specials

Until required for use the rubber rings shall be stored in a cool dark place, away from grease, oil or harmful chemicals. If rubber rings have been tied they shall be separated a few days before they are required for use in order to eliminate minor impressions which the ties may have caused.

Couplings into which rubber rings have been fitted, ready for use, shall be stored under cover. All couplings and specials shall be stacked off the ground to ensure that the protective coatings are not damaged.

(b) Stacking and transportation of pipes

The transportation and stacking of pipes shall be strictly in accordance with the manufacturer's requirements."

PSL-3.3 CI PIPES, FITTINGS AND SPECIALS

In the second sentence:

Change "AC pipes" to "AC, HDPE and PVC pipes".

PSL-3.4 STEEL PIPES, FITTINGS AND SPECIALS

Steel pipes of nominal bore up to and including 150 mm shall comply with the applicable requirements of SANS 62 heavy duty. Steel pipes of nominal bore above 150 mm shall comply with SANS 719 and SANS 1431 Grade 300WA/X42. The minimum wall thickness of steel pipes, fittings and specials shall be 4.0 mm.

Pipes shall be butt welded longitudinally and circumferentially by the submerged arc welding process. Spirally welded pipes will also be accepted. The welding processes and materials used for the fabrication of the pipes shall conform to SANS 10044. The inside and outside of every weld of the steel specials will be subjected to a dye-penetrant test as specified in Clause 7.2.1 of the SANS 1200L Standardized Specifications and BS 4416.

The Contractor shall provide all associated quality assurance documentation including certificates to ASME 9, welding procedure specification (WPS), welder qualification documentation, welding inspection/testing certificates, material certificates, certificate for consumables, etc. for all the pipes, pipe specials and flanges for the Engineer's approval. Payment for the quality assurance documentation shall be included in the rates for the scheduled pipe.

PSL-3.4.2 Pipes of Nominal Bore up to 150 mm

Replace the clause with the following:

"Steel pipes and fittings of nominal bore up to 150 mm shall be of heavy class and shall comply with the applicable requirements of SANS 62."

PSL-3.7 OTHER TYPES OF PIPES**PSL-3.7.1 uPVC Pipes**

Replace the clause with the following:

"uPVC pipes shall comply with SANS 966 Part 1 and be Class 16, unless otherwise specified on the drawings, and shall be produced in a factory of a registered member of the South African Plastic Pipe Manufacturers Association (SAPPMA). The uPVC pipe manufacturer shall be ISO 9001:2000 accredited and shall be a certified markholder of SANS 966 Part 1 and must be in possession of a permit to apply the SANS certification mark."

PSL-3.8 JOINTING MATERIALS**PSL-3.8.2 Flexible Couplings**

Add the following:

"Detachable couplings shall be of the "Viking - Johnson" type or approved equivalent without central register to SANS 1808-2, BS 534, BS 4772 and AWWA C219 unless otherwise specified. Coupling flanges shall be designed to withstand the hydrostatic test pressures, all stresses due to tightening of the bolts and the rubber gasket shall be EPDM and comply with SANS 974 and BS 2494.

The bolts and nuts shall be Grade 4.8 and comply with SANS 1143 and BS 970. Furthermore, the bolts, nuts and washers shall be hot dipped galvanised to SANS 121, SANS 32 and BS 729. Detachable couplings shall suit the outside dimensions of pipe-work complying with either BS 2035 or SANS 546 as the case may be.

The torque value recommended by the suppliers of flexible couplings for M12 bolts for flexible couplings up to 324 mm outside diameter, is 65-80 Nm. The recommended torque value for M16 bolts for flexible couplings over 324 mm outside diameter, is 80-120 Nm.

The basis for the tightening sequence is a criss-cross tightening pattern. In order to further to reduce the effects of elastic interaction, an approved lubricant or anti-seize compound (e.g. Copaslip) shall be used on the thread of the bolt and a multi-pass tightening sequence shall be followed. A lubricant reduces friction, thread wear and galling and allow the bolts to be re-used.

The multi-pass tightening sequence is when the bolts are initially tightened to a torque value below what is finally required and are re-tightened to a final torque on a subsequent tightening pass around the joint. The multi-pass tightening sequence shall be followed in increments of a torque value of maximum 50 Nm.

Following the final tightening pass, a checking pass shall be carried out in which all the bolts are checked to the final torque value. As a final check each bolt shall be 'ringed' by tapping lightly with a lead, or similar, hammer ensuring that the threads are not damaged. If any bolts are loose the tone of the sound given off will be different to a tightened bolt. A loose bolt could be as a result of cross-threading or similar problem in which the torque value may be achieved but no tension results in the bolt.

The EPDM gasket is to be lubricated prior to fitting. Failure to apply lubricant can cause difficulty in fitting and may result in gasket creep under load. This may cause bolt torques to drop thus necessitating re-tightening.

All flexible couplings shall be lined and coated with 300 micron DFT thermoplastic polymer Rilsan Nylon 11 to the manufacturer's specification."

PSL-3.8.3 Flanges and Accessories

Add the following:

"All flanges shall be to SANS 1123 Table 1600/3, unless otherwise specified or shown on the Drawings. All gaskets for flanged joints shall be in accordance with the requirements of BS 3063 and be full-faced 3 mm thick compressed asbestos fibre (CAF) type gaskets to BS 2815: Grade A.

Where connections are made to existing pipes, the dimensions of existing flanges and pipes shall be verified by the Contractor prior to ordering of materials.

Any item of pipework or special or valve of which the flanges are incorrectly drilled, will be rejected. The reaming of bolt-holes to oversized dimensions to enable a particular item to fit will not be allowed.

All bolts, nuts and washers used with fittings, flanges and couplings shall be hot dipped galvanised to SANS 121 and SANS 32. The bolts and nuts shall be hexagonal head type high tensile steel Grade 8.8 and comply with SANS 1700 and ISO 898.

All bolts must be of equal length. The length of each bolt shall be such that, after the nut has been tightened, the end of the bolt shall project above the nut by not more than six full threads and not less than one full thread. Two washers shall be used with every bolt connection to prevent damage to coatings.

Where used with pipes under ground, the connections shall be treated with an approved priming solution, packed with an approved mastic, and wrapped with an approved petrolatum tape with finishing layer by means of clingwrapping.

The bolt torque requirements for bolted connections are as follows:

*Note: above torque requirements are based on using Copaslip as lubricant

Bolt Description	Torque Requirement	
	Gr 4.8	Gr 8.8
M12 x 1.75	35 Nm	67 Nm
M16 x 2	86 Nm	167 Nm
M20 x 2.5	168 Nm	326 Nm
M24 x 3	291 Nm	563 Nm

*Note: above torque requirements are based on using Copaslip as lubricant

Bi-metal junctions shall be avoided or satisfactory steps shall be taken to obviate the galvanic corrosion effect from this cause. Suitable isolation shall be provided between flanges, washers and bolts to prevent galvanic corrosion between dissimilar metals (e.g. between mild steel and cast iron).

Prior to commencing tightening of a flanged joint it shall be ensured that the flanges are parallel to each other. Flanged joints shall be tightened following the specified tightening sequence to achieve an even bolt loading and to eliminate elastic interaction. The cause of uneven loading in the bolts, even when the same tightening torque is applied to all the bolts, is elastic interaction. This is when the tightening of one bolt affects the tension in a bolt next to it as a result of the joint compressing.

The basis for the tightening sequence is a criss-cross tightening pattern. In order to further to reduce the effects of elastic interaction, an approved lubricant or anti-seize compound (e.g. Copaslip) shall be used on the thread of the bolt and under the nut face, and a multi-pass tightening sequence shall be followed. A lubricant reduces friction, thread wear and galling and allow the bolts to be re-used.

The multi-pass tightening sequence is when the bolts are initially tightened to a torque value below what is finally required and are re-tightened to a final torque on a subsequent tightening pass around the joint. The multi-pass tightening sequence shall be followed in minimum four increments or a torque value of maximum 50 Nm.

Following the final tightening pass, a checking pass shall be carried out in which all the bolts are checked to the final torque value. As a final check each bolt shall be 'ringed' by tapping lightly with a lead, or similar, hammer ensuring that the threads are not damaged. If any bolts are loose the tone of the sound given off will be different to a tightened bolt. A loose bolt could be as a result of cross-threading or similar problem in which the torque value may be achieved but no tension results in the bolt.

Payment for protection of joints, isolation, bolts, nuts, washers and packings shall be included in the rates for the scheduled pipes, fittings, specials and valves."

Add the following clause:

"PSL-3.8.8 Ductile iron fittings for PVC pipes

All bends, reducers, T-pieces, flange adaptors, couplings and other fittings for PVC pipe shall be socketed ductile iron (spheroidal graphite iron) fittings complying with the requirements of EN 12842 and have a minimum working pressure of 16 bar."

PSL-3.9 CORROSION PROTECTION

PSL-3.9.1 CI Pipes

In the heading:

Change "CI pipes" to "CI and DI pipes"

Add the following:

“All socketed ductile iron (spheroidal graphite iron) bends, reducers, T-pieces, flange adaptors, couplings and other fittings for PVC pipe shall be coated internally and externally with 250 micron Plascoat PPA 571 HES fusion bonded thermoplastic to the manufacturer's specifications.

Lined and coated pipe specials shall be protected against damage at all stages from manufacture to construction.

All underground fittings and flexible and flanged joints together with their bolts shall be treated with an approved priming solution, packed with an approved mastic, and wrapped with an approved petrolatum tape with finishing layer by means of clingwrapping.

Payment for corrosion protection shall be included in the rates for the scheduled pipes, fittings and specials.”

PSL-3.9.2 Steel Pipes

Add the following:

“All steel pipes, specials and fittings with nominal diameter up to and including 150 mm diameter shall be hot dipped galvanised to SANS 121 and SANS 32. Mechanical damages of the hot dipped galvanising shall be repaired using Zincfix (or similar approved) to the manufacturer's specifications.

Hot dipped galvanised pipes and pipe specials outside valve chambers shall be treated with an approved priming solution and wrapped with an approved petrolatum tape with finishing layer by means of clingwrapping.

All steel pipes, specials and fittings with nominal diameter greater than 150 mm diameter shall be lined internally and coated externally with Carboguard 891 applied in three coats of minimum 125 micron per coat to the manufacturer's specifications unless otherwise indicated on the drawings or scheduled.

Where a cement mortar lining is specified for steel pipes, the cement mortar lining shall be minimum 12mm thick and comply with AS 1281.

Where steel pipes are installed in very aggressive soil conditions, the pipeline shall be lined internally with Carboguard 891 applied in three coats of minimum 125 micron per coat to the manufacturer's specifications and coated externally with minimum 1.6 mm thick Sintakote II fusion bonded medium density polyethylene coating to AS 4321 to the manufacturer's specifications unless otherwise indicated on the drawings or scheduled.

Lined and coated pipes and specials shall be protected against damage at all stages from manufacture to construction. Mechanical damages at any stage to the corrosion protection shall be repaired to the manufacturer's specifications.

The Contractor shall appoint an independent coating inspector to:

- carry out random checks at different stages of the application of the corrosion protection in terms of preparation before application (sand blasting), humidity checks during application, proper use of application equipment, etc;
- take DFT measurements of all the steel pipes, specials and fittings during the different stages of application of the corrosion protection;
- to carry out pinhole testing of all the steel pipes and specials; and
- on completion of the inspection of all the steel pipes, specials and fittings, a Certificate of Conformance has to be issued to the Engineer for approval.

All underground fittings and flexible and flanged joints together with their bolts shall be treated with an approved priming solution, packed with an approved mastic, and wrapped with an approved petrolatum tape with finishing layer by means of clingwrapping.

Payment for corrosion protection and the independent coating inspection shall be included in the rates for the scheduled pipes, fittings and specials."

PSL-3.9.5 Joints, Bolts, Nuts and Washers

Substitute the clause with the following:

"All joints, bolts, nuts and washers shall be high tensile steel and shall be hot dipped galvanised to SANS 121 and SANS 32."

PSL-3.9.6 Corrosive Soil

Substitute the clause with the following:

"All under ground connections of valves, steel or cast iron fittings shall be treated with an approved priming solution, packed with an approved mastic, and wrapped with an approved petrolatum tape with finishing layer by means of clingwrapping."

PSL-3.10 VALVES

Add the following:

"PSL-3.10.1 Isolating valves

All isolating valves up to and including 300 mm diameter shall be of the sluice valve type and all isolating valves greater than 300 mm diameter shall be of the butterfly type.

PSL-3.10.1.1 Gate Valves

All isolating valves of size up to and including 300 mm shall be suitable for working pressure of 1.6 MPa (i.e. Class 16) and shall be double flanged cast iron, cast steel or spheroidal graphite iron wedge gate or RSV type according to the latest SANS 664. The valves shall have a brass gate and non-rising 316 stainless steel spindle and brass or bronze guides.

For RSV gate valves the body and bonnet shall be Ductile Iron GGG-50 to DIN 1693. The wedge shall be Ductile Iron GGG-50, fully encapsulated with EDK 70 rubber internally and externally so as to prevent corrosion and rubber failure. The wedge nut must be of the "fixed nut" concept, press fit into the wedge, allowing no movement and manufactured from dezincification resistant high tensile navy brass. The wedge shall be supported by guides in the side of the valve body, and no metal to metal contact between the gate and guides shall be accepted.

All rubber shall be ozone stabilised and UV-resistant. The valve stem shall be Stainless Steel to DIN X 20 Cr 13. The primary seal must be a NBR rubber hydraulic U seal (Manchette type), and the secondary seal at least two NBR O-rings inside and two outside of Nylon Bush for galvanic corrosion protection. The stem sealing arrangement shall include a wiper ring to prevent dirt ingress from the outside, and it shall be housed so as to protect it from UV radiation.

The thrust collar shall be dezincification resistant brass CZ 132 to BS 2874. The bonnet bolts shall be entirely sunk into the body casting, sealed and protected by hot wax melt. The bolts shall be grade 8.8 high tensile bolts and hot dip galvanised.

Gate valves shall be anti-clockwise closing with direction of opening clearly marked on the valve body and be fitted with a square spindle nut, suitable to be used with a valve key in the vertical position and secured with retaining bolts. All gate valves shall be driptight when tested in accordance with the requirements of BS 5163. Pipes shall not be tested against a closed valve. Thrust blocks for test sections shall be approved by the Engineer prior to testing of pipes.

Valves shall be grit blast cleaned to S15 standard and a solvent-free sintered epoxy powder applied in one coat by the use of arc-spray machines to provide a dry film thickness of not less than 450 micron.

PSL-3.10.2 Scour Valves

All valves for scour valves shall be gate valves.

PSL-3.10.3 Air Valves

The air valves shall be of the compact single chamber design with solid cylindrical HDPE control floats housed in a tubular stainless steel body with epoxy powder coated cast iron or steel ends secured by means of stainless steel tie rods.

The valve shall have an integral Anti Shock Orifice mechanism which shall operate automatically to limit transient pressure rise or shock induced by 2 x valve rated working pressure. The intake orifice area shall be equal to the nominal size of the valve, i.e. a 150 mm (6") valve shall have a 150 mm (6") intake orifice.

The orifice sealing shall be effected by the flat face of the control float seating against a nitrile rubber 'O' ring housed in a dovetail groove circumferentially surrounding the orifice. Discharge of pressurized air shall be controlled by the seating and unseating of a small orifice nozzle on a natural seal affixed into the control float. The nozzle shall have a flat seating and surrounding the orifice so that the damage to the rubber seal is prevented.

The valve construction shall be proportioned with regard to material strength characteristics, so that deformation, leaking or damage of any kind does not occur by submission to twice the designed working pressure. The valve design shall incorporate an over pressure safety feature that will fail without an explosive effect, such as is normally the case when highly compressed air is released suddenly. The feature shall consist of easily replaceable components such as gaskets, seals or the like.

Connection to the valve inlet shall be facilitated by a screwed BSP (ISO R7) or NPT male end or a flanged end conforming to PN10, 16, 25 or 40 rating of BS 4504 or SANS 1123 Standards or, ANSI B16.1 Class 125 and Class 250 and ANSI B16.5 Class 300 Standards. Flanged ends shall be supplied with the requisite number of stainless steel or mild steel screwed studs inserted for alignment to the specified standard nuts, washers and jointing gaskets.

Air valves shall be able ensure a positive driptight closure from a minimum pressure of 50 kPa up to the maximum rated pressure. The small orifice shall remain functional throughout the entire pressure range up to the rated pressure. The large orifice shall emit air at the required rate without closing as a result of the forces caused by the air speed.

PSL-3.10.4 Check Valves

The check valves shall conform to SANS 1551-1 for general waterworks practice and shall be double flanged or double-door wafer check valves with 16 bar working pressure.

Double-door wafer check valves shall have a stainless steel spring to aid closure and the doors shall be of bronze, stainless steel or other approved material.

The leakage shall be less than that specified in SANS 1551-1: 4.3.4(e). Castings shall be inspected for acceptability in accordance with SANS 1551-1: 4.3.5.1 (d).

The valves shall be coated in either sintered epoxy, a solvent-free epoxy or other approved finish suitable for long-lasting waterworks practice.

PSL-3.10.5 Control valves

All control valves shall be the Y-pattern type suitable to be fitted with a V-port plug.

PSL-4 PLANT**PSL-4.3 TESTING**

Add the following:

“The Contractor must ensure that the test equipment is calibrated and in good working order.”

PSL-5 CONSTRUCTION**PSL-5.1 LAYING****PSL-5.1.1 General**

Add the following to the first paragraph:

“Pipes and specials shall be lifted only by means of broad band slings.”

Replace the last paragraph with the following:

“Control of laying and bedding shall be by means of an acceptable lazer beam instrument.”

PSL-5.1.4 Depths and Cover**PSL-5.1.4.1 Add the following:**

“Unless otherwise shown on the drawings or instructed by the Engineer, the cover to all pipes, measured below finished surface level, shall be not less than 1000 mm.”

Add the following clause:

“PSL-5.1.5 Connection to Existing Pipelines

Where connections to existing pipelines are required, the Contractor shall excavate well in advance of work being undertaken to expose the connection point to verify that the assumed fittings are available on site and that the connection as proposed can be made. It should be noted that it may be necessary to expose a full pipe length to verify the size and class of pipe in the ground or to locate an existing fitting.

The following will apply:

1. Water supply disruption must be kept to a minimum.
2. Connections will take place after the testing of the new pipeline(s) has/ have been completed.”

PSL-5.6 VALVE AND HYDRANT CHAMBERS**PSL-5.6.1 General**

Substitute the first sentence with the following:

The drawings of valve and hydrant chambers issued with the document shall supersede the corresponding drawings in the standard specification.

PSL-5.6.2 Construction of Chambers

Substitute “Drawings L-1, L-2 and L-3” in the second sentence with “drawings which are issued with the document”

PSL-5.10 DISINFECTION OF POTABLE WATER PIPELINES

The disinfection of the potable water pipelines shall be carried out by the Contractor.

PSL-7.3 STANDARD HYDRAULIC PIPE TEST**PSL-7.3.1 Test Pressure and Time of Test**

PSL-7.3.1.1 The Contractor shall undertake pressure testing of the pipeline in the presence of the Engineer at convenient lengths not exceeding 500 meters or over a portion where more than 25 m difference in static head is experienced.

Pipes shall not be tested against isolating valves. Special blank flanges or end caps, fully anchored, shall be provided for testing.

PSL-7.3.1.2 Substitute the clause with the following:

The test pressure for field testing shall be 1.5 times the rated maximum working pressure of the pipe e.g. class 10 pipe (1 MPa rated working pressure) shall be tested to 1.5 MPa and Class 12 pipe (1.2 MPa rated working pressure) to 1.8 MPa.

PSL-7.3.1.3 Substitute the clause with the following:

The test pressure applied according to PSL 7.3.1.2 must, with allowance for any level difference along the pipe line, be such that the pressure at any point in the pipe will be at least 1.25 times and not more than 1.5 times the rated working pressure of the pipe.

PSL-7.3.1.4 Replace the contents of this clause with the following:

“The pipeline shall be tested to the following pressures:

PVC Class 12 – 1500 kPa (min); 1800 kPa (max)

PVC Class 16 – 2000 kPa (min); 2400 kPa (max)

PSL-7.3.3 Permissible Leakage Rates

Replace “cast iron” in Clause 7.3.3 b) with “ductile iron”.

Add the following clause :

“PSL-7.5 Hydrostatic Pressure Testing of Spigot / Socket Joints

At least three spigot / socket joints per batch of uPVC pipes shall be subjected to the one hour test as described in Section 5.8 of SANS 966 Part 1 at a laboratory approved by the Engineer. The tests shall be witnessed by the Engineer. Should any of the tests fail, the associated uPVC pipe batch will be rejected.

Payment for hydrostatic pressure testing shall be included in the rates for the scheduled pipes.”

PSL-8 MEASUREMENT AND PAYMENT**PSL-8.1 GENERAL**

Add the following:

"The price tendered and paid for laying and coupling of pipes and fittings in items 8.2.1 to 8.2.7 shall include for the provision of corrosion protection as specified in Subclause PSL 3.9."

PSL-8.2 SCHEDULED ITEMS**PSL-8.2.1 Supply, lay and bed pipes complete with couplings.....Unit: m**

In the heading:

Change "Supply, lay and bed pipes complete with couplings" to "Supply, handle, lay, bed (for flexible pipes), joint, test and disinfect pipes complete with couplings (waste and cut lengths to be allowed for in these rates)".

The rate shall also cover the cost for hydrostatic pressure testing as per Clause PSL-7.5, handling of the pipes, hydraulic testing, disinfecting and cutting of the pipe and the supplying and fixing of the extra coupling where required.

PSL-8.2.2 Extra-over 8.2.1 for the supplying, laying, and bedding..... Unit : No of specials complete with couplings

In the heading:

Change "Extra-over 8.2.1 for the supplying, laying, and bedding of specials complete with couplings" to "Extra-over 8.2.1 for the supplying, laying, and bedding of fittings and specials complete with couplings, including cutting pipes to length where required, test and disinfect".

The rate shall also cover the cost for supplying all specials complete with couplings including bolts, nuts, washers and packings to join to the pipes including cutting of the pipe, testing and disinfecting.

PSL-8.2.4 Extra over 8.2.1 for the Cutting of the Pipe and theUnit : No Supplying and Fixing of the Extra Coupling.

Delete this item for this Contract.

PSL-8.2.5 Supply and place Pipes, Valves and Specials.....Unit : No

In the heading:

Change "Supply and place pipes, valves and specials" to "Supply, handle, install and commission pipe specials, valves and fittings in valve chambers complete".

PSL-8.2.11 Anchor/thrust blocks and pedestals

Substitute the clause with the following:

Anchor / thrust blocks and pedestals shall be measured per cubic metre concrete and the tendered rate shall include for all excavation, trimming, formwork, reinforcement (where specified), placement of concrete and screeding of tops surfaces for the required dimensions as indicated on the drawings.

Separate additional payment will be made for intermediate and hard rock excavation and for ready bars, nuts, washers and clamp with rubber lining, where applicable.

Add the following clause:

“PSL-8.2.16 Cut into and connect to existing water mains..... Unit : No:

This item is an extra-over for items as specified in the “Bills of Quantities”.

The cutting into existing water mains shall be measured by the number of each type and diameter of pipe cut into.

The tendered rate shall include full compensation for all arrangements with the relevant authorities and cover the cost of isolating the main, excavation, exposing the pipe, securing the existing pipeline against unbalanced thrust, cutting into the main to accommodate the connecting fittings, dewatering, removing of excess material, taking preventative measures against ingress of soil and debris into the water system as well as all material and labour to connect the pipe.”

PSLB	BEDDING (PIPES)
PSLB-3	MATERIALS
PSLB-3.1	SELECTED GRANULAR MATERIAL
	Substitute the clause with the following: "Selected granular material shall be an aggregate, sand or granular material, all of a non-cohesive nature and free from any organic material, of which the grading analysis shows 100% passing a 13.2 mm sieve and not more than 5% passing a 0.075 mm sieve."
PSLB-3.3	BEDDING
	Add the following: "The pipelines to be regarded as flexible are HDPE, PVC and GRP pipes. All other pipes shall be regarded as rigid and laid on Class C bedding."
PSLB-3.4	SELECTION
PSLB-3.4.1	Suitable Material Available from Trench Excavation
	Add the following: " notwithstanding anything to the contrary, the Contractor will be required to select suitable material from trench excavation for use as bedding material by means of labour intensive methods." Add the following clause:
PSLB-3.5	STONE BEDDING
	Stone bedding shall consist of 13 mm concrete aggregate."
PSLB-5	CONSTRUCTION
PSLB-5.1	GENERAL
PSLB-5.1.4	Compacting
	Substitute "90% of modified AASHTO" with "93% of MAASHTO". Add the following: "..... for materials other than sand and shall be 100% of mod AASHTO density for sand." Add a new clause :
PSLB-5.5	Stone Bedding
	The use of stone bedding is normally indicated when unstable waterlogged conditions prevail despite reasonable measures having been taken by the Contractor to deal with the conditions."

PSLB-6 TOLERANCES**PSLB-6.1 MOISTURE CONTENT AND DENSITY**

Degree of Accuracy II shall be applicable.

PSLB-7 TESTING**PSLB-7.2 COMPACTIBILITY**

The compactibility test shall be carried out as follows:

"Apparatus

- Cylinder. An open-ended cylinder of length approximately 250 mm and nominal internal diameter 150 mm.
- Rammer. A metal rammer of mass approximately 1 kg and having a striking face of diameter approximately 38 mm.
- Rule. A steel rule graduated in millimetres.

Procedure

Obtain a representative sample of the material as follows:

Heap about 160 kg of the material on a clean surface, mix it thoroughly, divide it into two parts of approximately equal size, and discard one part. Repeat the mixing, division, and discarding procedure until a sample of mass about 10 kg is obtained. Ensure that the moisture content of the sample is approximately the same as that of the main body of bedding material at the time that it will be used in the trench.

Place the cylinder on a firm flat surface and gently pour the sample into it, taking care not to compact the material in any way. Strike off the top surface of the material level with the top of the cylinder, and remove all surplus material from the flat surface. Lift the cylinder up clear of its contents and place it on a fresh area of the flat surface.

Return about one-quarter of the sample material to the cylinder and tamp vigorously until no further compaction can be obtained. Repeat this procedure with each of the other quarters, adding each, in turn, to the material in the cylinder and tamping the final surface as level as possible.

Measure the distance from the level of the compacted sample to the top of the cylinder and record this distance divided by the height of the cylinder as the compatibility factor of the bedding material.

Evaluation of Results

Compactibility factor	Evaluation
Up to and including 0.1	Material suitable for bedding
Over 0.1 up to and including 0.4	Material suitable (except for flexible pipes that may be subject to waterlogged conditions after laying) but requires extra care in compaction.
Over 0.4	Material unsuitable."

PSLB-8 MEASUREMENT AND PAYMENT**PSLB-8.1 PRINCIPLES****PSLB-8.1.1 Supply of Bedding Materials Measured Separately**

Add the following:

"Payment for bedding material and selected fill material is only made if the selected trench-excavation material cannot be used in the same position as bedding material but has to be obtained from another part of the site of works or designated borrow pits, or from commercial sources."

PSLB-8.1.3 Volume of Bedding Materials

Add the following:

"The volume of bedding material shall exclude the volume of the pipe."

PSLB-8.1.4 Separate Items for Cradle and Blanket

Substitute the clause with the following:

"Although distinction may be made in terms of items for the bedding cradle and selected fill blanket, the material in both cases shall comply with the requirements for material for bedding cradle."

PSLB-8.1.5 Disposal of Displaced Material

Add the following:

"It is the Contractor's responsibility to find spoil sites at his cost should this be necessary."

PSLB-8.2 SCHEDULED ITEMS**PSLB-8.2.1 Provision of Bedding from Trench Excavation:**

Amend the payment clause to read as follows:

"The rate shall cover the cost of acquiring such bedding materials (each of which shall comply with the applicable requirements of SANS 1200LB), delivering them to points alongside the trench so spaced as to suit the Contractor's method of working and disposing of any material displaced by the importation.

The rate shall apply regardless of whether the Contractor acquires the bedding materials either by selection from excavated material alongside the trench, or from other sources on site to meet the requirements of Subclause 3.1. The screening or sieving of material if required, will not be paid separately."

PSLB-8.2.2 Supply only of Bedding by Importation**PSLB-8.2.2.3 From commercial sources :**

Add the following :

" c) 13 mm stone bedding.....m³

Payment for stone bedding shall only be made if the Engineer agreed in writing that the conditions warranted the use of stone bedding."

**PSLB-8.2.5 Overhaul of Material for Bedding Cradle and.....Unit : m³.km
Selected Fill Blanket**

Change the heading from "Overhaul of Material for Bedding Cradle and Selected Fill Blanket" to "Overhaul of Material for Bedding (Provisional)".

Amend the clause as follows :

"The overhaul of material for bedding shall be measured in "m³" and the rate shall cover the cost of transporting the bedding material to site."

Add the following clause :

**PSLB-8.2.6 Supply, handle and install 270 g/m² needle-punched.....Unit : m of trench
nonwoven polyester geotextile with a 300 mm overlap with stone bedding**

The rate shall cover all costs to supply and install a 270 g/m² needle-punched nonwoven polyester geotextile by wrapping around the crushed stone at an average cloth width 3 m per m trench."

OVERSTRAND MUNICIPALITY

QUOTATION NO SC 646/2009

UPGRADING OF THE FILTRATION PLANT AT BAARDSKEERDESBOS

5 PARTICULAR SPECIFICATIONS

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PMF FILTRATION PLANT**PMF-1 SCOPE**

This Specification covers the general requirements for the design, manufacture, supply, delivery, installation and commissioning of the filtration plant at Baardskeerdersbos. The contractor is required to complete the works by 30 June 2009.

PMF-2 TECHNICAL INFORMATION REQUIRED

The tenderer shall, at the tendering stage, include detailed information and technical data on all the materials and equipment offered for the upgrading of the filtration plant at Baardskeerdersbos. Manufacturer's pamphlets and catalogues shall be edited and clearly marked so as to describe the particular equipment offered. The Contractor shall submit the following detailed technical information with his tender:

- (a) Schematic layout of the proposed filtration plant indicating the flow directions during normal operation, filter backwashing and filter bypass. Furthermore, the following shall be indicated:
 - Connection to the existing infrastructure.
 - Positions of the control, backwash, isolating, air and scour valves, pressure gauges and flow meter.
- (b) Written proposal explaining, in detail, the filtration plant operation and maintenance methodology.
- (c) Detailed technical drawings indicating layout and plan views of the proposed filtration plant including the connection to the existing infrastructure.
- (d) Detailed technical drawings of the pressure filter, indicating section and plan views, dimensions, collector drain details and floor connection details.
- (e) Detailed technical specification sheets of the following:
 - Backwash valves
 - Isolating valves
 - Control valves
 - Non-return valves
 - Flow meter
 - Pressure gauges
- (f) Detailed cost breakdown for the complete installation of the filtration plant.

Costs related to the supply of the abovementioned information shall be included in the price tendered for the filtration plant to be installed. In the case of nominated subcontracts the Principal Contractor shall be responsible for supplying the required technical information.

PMF-3 MATERIALS AND EQUIPMENT**PMF-3.1 Guarantee**

All equipment shall be guaranteed against faulty design, materials and workmanship for a period of two (2) years from the date of final completion. During this period the contractor shall attend to and rectify, at his own cost, any defects which can be attributed to faulty design, materials and workmanship. Normal wear and tear shall be excluded. Proof of guarantee shall be submitted to the Engineer within two (2) weeks from the Commencement Date.

PMF-4 PLANT REQUIRED AND DELIVERIES

The Contractor shall be responsible for off-loading all the material and equipment at the site as well as the storing of such material in a depot indicated by the Engineer.

No delivery shall take place on Saturdays, Sundays or statutory non-working days unless special arrangements have been made with and agreed to by the Engineer. The Contractor shall be solely responsible for obtaining transport permits and clearance from road or rail authorities for the transporting and delivery of materials and equipment as well as the compliance with the requirements of such bodies.

The Contractor shall be responsible for the supply, delivery, installation and commissioning of the following:

- (i) Construction of a filtration plant building.
- (ii) The filter units together with all the mechanical equipment, valves, flow meter, pressure gauges, interconnecting pipework and electrical work necessary for the correct functioning of the whole.
- (iii) All electrical equipment on the distribution side of a power supply point.
- (iv) Any other equipment included in the quotation by the Contractor.

PMF-5 MULTIMEDIA PRESSURE FILTER

The operation of the multimedia pressure filter shall be automatic with the option of manual operation.

PMF-5.1 Pressure filter

The pressure filter body shall be 940 mm in diameter and have a vertically extended body (to provide sufficient depth for the required filter media), be manufactured from carbon steel and be fitted with a grade 304 stainless steel lid locking ring, inlet dished diffuser, and threaded rod and wing nut on the lid. The inlet of the pressure vessel shall be fitted with a stainless steel strainer to prevent the anthracite filter media from backwashing out of the filter.

The filter shall be internally coated with three layers of Carboguard 891, applied in three layers of not less than 125 µm per layer, suitable for drinking water purposes. Internal piping shall be hot dipped galvanised to SANS 121 and SANS 32. Mechanical damages of the hot dipped galvanising shall be repaired using Zincfix (or similar approved) to the manufacturer's specifications. The filter shall be externally coated with a 250 µm pure polyester ultraviolet (UV) resistant coating.

Lined and coated parts shall be protected against damage at all stages from manufacture to construction. Mechanical damages at any stage to the corrosion protection shall be repaired to the manufacturer's specifications.

The Contractor shall appoint an independent coating inspector to:

- carry out random checks at different stages of the application of the corrosion protection in terms of preparation before application (sand blasting), humidity checks during application, proper use of application equipment, etc;
- take DFT measurements of the filters during the different stages of application of the corrosion protection;
- to carry out pinhole testing of all the filters; and

- on completion of the inspection of the filters, a Certificate of Conformance has to be issued to the Engineer for approval.
- Payment for corrosion protection and the independent coating inspection shall be included in the rates for the scheduled pipes, fittings and specials."

PMF-5.2 Filter media

The multimedia pressure filter shall be provided with anthracite and sand as filter media. As part of the process control the Contractor shall provide a complete grading analysis, performed by a commercial accredited soil testing laboratory, a complete grading analysis of the filter media offered, indicating that filter media conforms to the specification. The characteristics and the depth of the dual media filter bed shall be as follows:

PMF-5.2.1 Anthracite

The anthracite filter media shall be obtained from an approved commercial supplier and be clean from scaly pieces, clay, iron, sulphides or dirt. The anthracite shall also conform to the requirements of the American Water Works Association (AWWA). Furthermore, the following characteristics shall apply to the anthracite filter media:

Relative density:	1.6
Effective particle size:	1.3 mm
Uniformity coefficient:	≤ 1.5
Filter media depth:	600 mm

PMF-5.2.2 Sand

Sand media shall be clear quartzitic sand with a acid solubility of less than 0.15 % and must have a silica content greater than 99 %. Furthermore, the following characteristics shall apply to the sand filter media:

Relative density:	2.65
Effective particle size:	0.65 mm
Uniformity coefficient:	≤ 1.5
Filter media depth:	600 mm

PMF-5.2.3 Commissioning of the filter media

Sand media shall be placed in the pressure filters. After ten backwash cycles the fine particles accumulated at the top of the filter media (approximately 10 mm) shall be removed. The Contractor should note that the required filter depth for the sand filter media is 600 mm and that this layer thickness should be achieved when the top 10 mm of the filter media is removed.

After the flushing of the fine sand particles, the anthracite layer can be placed on top of the sand media. After ten backwash cycles, remove the fine anthracite fragment, i.e. the top 10 mm of the anthracite filter media. Anthracite layer thickness to be achieved is 600 mm after the fine fragment is removed.

PMF-5.3 Pipework

The requirements for the pipework are as follows:

- Pipework shall be mild steel and comply with Clause PSL-3.9.2.
- Pipe diameters not specified shall be determined by the Contractor to suit equipment offered and shall conform to the required flow rates and specifications.
- Pipework shall be adequately supported by brackets or other suitable methods. Additional support shall be provided if required by the Engineer.

PMF-5.4 Flow meters and pressure gauges

Flow meters shall be supplied and installed in the filtered water stream to indicate the filtered water flow rate. The flow meter shall be turbine type with hermetically sealed register to IP 68. The internal rotor of the water meter shall be hydrodynamically balanced.

Upstream and downstream pressure gauges shall be glycerine-filled and wall-mounted. Gauge diameter shall not be less than 150 mm. Copper piping shall be used for gauge connection. Gauges shall be calibrated and shall show the pressure in kPa. Scales shall be so chosen that the normal operating conditions shall indicate 75% of full scale reading.

PMF-5.5 Valves**PMF-5.5.1 Butterfly Valves**

Butterfly valves shall be flangeless wafer type and comply with international standards, certificates according to ISO 10474/EN 10204, 2.3, 3.1B, 3.1C. The valves shall be of centric design, and have an integral vulcanized bonded rubber seat (hot melted rubber injection molded under pressure-not a glued rubber lining). The valve shall not be of the loose/removable lining type. The non-removable integral vulcanized seat design valve must be able to be used as an Isolating Valve (on/off) and/or regulating valve. The valve must be Bi directional tight shut off according ISO 5208, Rate A. Face to face dimensions shall be according to ISO 5752 / EN 558, basic series 20 (wafer short).

The valve body shall be manufactured from ductile iron GGG-40. Furthermore, the body must be fully corrosion protected inside by the integral EPDM (shore A hardness of 70) vulcanized bonded rubber seat and outside by an electrostatically applied fusion bonded epoxy resin of minimum 300 micron DFT. The disc shall be ductile cast iron with Rilsan coating. The disc must have a profiled sealing edge with the geometry of a of a centric loaded toroid, to allow less wear of the integral vulcanized bonded rubber seat, a low seating angle and low operating torques. The pin shall be Martensitic stainless steel, Grade 431.

The valve shall be hand lever operated. The hand lever shall be spring loaded with a 10 locking position lever notch plate which provides quick operation, When lever is not in manual control it always returns to latched position.

The valve shall have a performance guarantee of 500 000 operating cycles – maintenance free.

PMF-5.5.2 Scour Valves

All valves for scour valves shall be gate valves.

PMF-5.6 Backwashing

Only treated water shall be used for the backwashing of the filters. Backwashing of the filter should take place not more than once daily.

PMF-6 ELECTRICAL INSTALLATION

All electrical installations shall conform to SANS 10142 Part 1.

PMF-7 TOLERANCES

Tolerances are to be such that the equipment performs within the requirements of this specification.

PMF-8 MAINTENANCE OBLIGATION

The Contractor shall maintain all equipment provided in a good working order during the 12 month maintenance period, and shall specify in his tender the number of routine maintenance visits to be undertaken.

The maintenance period shall commence on the day following the final completion, as agreed to by the Engineer.

The Employer reserves the right to undertake any emergency repair work during the maintenance period without the prior consent of the Contractor. The Engineer has the right to decide whether the emergency exists and shall notify the Contractor accordingly. Should this emergency repair work be caused by poor material, faulty workmanship or neglect on the part of the Contractor, the Employer may deduct the cost of the repair work from the outstanding retention money owing to the Contractor.

PMF-9 OPERATION AND MAINTENANCE MANUAL

Five comprehensive copies of operation and maintenance instructions in the form of hard covered manuals with a rear pocket enclosing prints of relevant as-built drawings shall be supplied.

All manuals shall be supplied prior to handover/acceptance of equipment. The Completion Certificate will neither be issued nor will the corresponding payment be made until the above manuals and drawings have been supplied.

Operating instruction shall include:

- index;
- pre-start check list;
- step by step description of the approved procedures for all modes of operation of equipment; and
- description of required safety checks.

Maintenance manual shall include:

- index;
- details of routine and regular maintenance work which the manufacturer considers necessary to maintain equipment in satisfactory running order;
- instruction for the repair or replacement of worn or damaged parts;
- schedules of routine testing of electrical equipment (as recommended by specific suppliers);
- spare parts list;
- particular technical data of equipment;
- preference list, including local agents for supply and repairs of specific equipment; and
- all schematic wiring diagrams pertaining to technical equipment.

The Contractor shall, in addition to supplying the above information, undertake to instruct departmental staff and satisfy himself that they are capable of operating all equipment when it has been commissioned.

PMF-10 OPERATING INSTRUCTION BOARD

An approved concise operating instruction notice board in "engraved aluminium" shall be supplied and erected at the most appropriate place by the Contractor. Letters shall not be smaller than 8 mm.

PMF-11 TESTING

On completion of the installation and as soon as convenient for the client, but not later than five weeks after completion, the complete works shall be started up, tested, and commissioned to the satisfaction of the Engineer.

PMF-12 MEASUREMENT AND PAYMENT**PMF-12.1 Supply, deliver, install, commission and maintain (during defects liability period) of pressure sand filtersUnit: No**

The tendered rate for item PMF-12.1 shall cover the design, manufacture, supply, delivery, installation, testing, commissioning and maintaining, for a period of 12 months, the filtration units. In addition, the rate shall include all the supervision, labour, machinery, equipment, tools and extras required to complete, protect and maintain the equipment as specified. 10% of the payment for this item will be withheld until receipt of the final operation and maintenance manuals.

PMF-12.2 Supply, deliver, install, commission and maintain (during defects liability period) of filtration plant pipework and accessoriesUnit : Sum

The tendered rates for item PMF-12.2 shall be a Lump Sum and include the complete supply, transport, installation, testing and maintaining for a period of 12 months, accessories for the filter installation, including air, control, backwash and isolating valves, flow meter, pressure gauges, appurtenant pipework, filter automation, filter media and filter backwash automation, and the connecting of the pressure sand filter units to the existing infrastructure, as specified.

PMF-12.3 Filtration plant building.....Unit: Sum

The price shall be a lump sum price for the filtration plant building, including all material, labour, plant and equipment needed to complete the work as per Drawing No J00991-01-036-001.

PMF-12.4 Compile, supply and deliver a complete set of operation and maintenance manuals for the filtration plant as specified and measured in PMF-9Unit : Sum

The tendered rates for item PMF-12.4 shall cover the cost of providing complete operation and maintenance manuals as specified in PMF-9.

PMF-12.5 Testing of filters as specified and measured in PMF-11..... Unit : No

The tendered rates for item PMF-12.5 shall cover the cost of testing as described in PMF-11.

PMF-12.6 Supply, deliver, install and commission power supplyUnit : Prov Sum

The tendered rates for Item PMF-12.6 shall cover all cost relating to the electrical installations related for the completion of the works, as per Clause PMF-6.

PMG GROUTING OF MACHINE AND STRUCTURAL BEDPLATES**PMG-1 SCOPE**

This section covers the specification for grouting of bedplates for mechanical equipment. This specification is intended to supplement or replace Clause 5.5.13 of SANS 1200 G: Concrete (Structural) where applicable.

PMG-2 INTERPRETATION

The interpretation clause of SANS 1200G: CONCRETE (STRUCTURAL) and the interpretation in relevant standard specifications shall apply.

PMG-3 MATERIALS**PMG-3.1 Water**

Water for grout shall comply with the requirements of SANS 1200 G, subclause 3.3.

PMG-3.2 Aggregates

Notwithstanding the requirements of Subclause 3.4.1 of SANS 1200 G, the grading of fine aggregate (sand) and coarse aggregate (stone or pea gravel) shall conform to the gradings given in Tables PMG-1 and PMG-2 respectively, hereafter.

TABLE PMG-1 - SAND

Test sieve nominal aperture size, mm	% Passing (by mass)
9,5	100
4,75	95-100
1,18	46-65
0,300	5-15
0,150	0-5

TABLE PMG-2 - STONE OR PEA GRAVEL

Test sieve nominal aperture	% Passing (by mass)
9,5	100
4,75	95-100
2,36	0-5

PMG-3.3 Cement

Cement shall be ordinary portland cement complying with SANS 40197.

PMG-3.4 Admixtures

Admixtures shall comply with the requirements of Subclause 3.5 of SANS 1200 G and shall have a proven record of satisfactory performance under conditions encountered in the Republic of South Africa and shall be approved by the Engineer prior to its use.

PMG-3.5 Proprietary grouting materials

Unless otherwise approved by the Engineer, proprietary grouting materials shall be provided ready-mixed in sealed pockets as supplied by the manufacturers.

PMG-4 CONSTRUCTION**PMG-4.1 Preparation and procedures**

- (a) Before a machine or structural bedplate is placed on the concrete the following procedure shall be followed:
 - (i) All defective concrete, laitance, dirt, oil, grease and loose material shall be removed from the concrete foundation by bush-hammering, chipping, or other means until sound clean concrete is obtained. The surface of the foundation shall be scabbled, but shall not be so rough as to interfere with proper placing of the grout. All foundation bolt sleeves shall be cut out, or cut off flush if the sleeves cannot be removed. The top of the foundation shall be re-shaped if necessary.
 - (ii) The underside of each steel base, particularly in the bearing areas, shall be cleaned and any burrs and ragged edges removed before the base is placed in its final location.
 - (iii) All holding-down bolt sleeves shall be thoroughly cleaned of any materials that may prevent the grout from flowing freely to the bottom of the bolt sockets.
- (b) The base shall be properly aligned and levelled and shall be maintained in that position during grouting.
- (c) After the machine or structural bedplate has been placed the following precautions shall be observed:
 - (i) Shimming shall be kept to a minimum. Steel plates shall be used for packing and shall be ground to the required thickness, where necessary.
 - (ii) Before grouting is started all loose dirt, oil, grease and other foreign matter on the surface of the foundation, the undersides of bedplates, and in the bolt holes shall be removed by means of compressed air or other approved means. The surface of the foundation slab shall be thoroughly saturated with clean water, and all free water shall be removed from the surface and the bolt holes just before the grout is placed.
 - (iii) Grouting shall not be carried out until the alignment of all units to be grouted has been checked and approved by the Engineer.
 - (iv) Special care shall be taken with grouting in hot or cold weather to ensure proper setting and gain of strength and, in the case of proprietary grouting materials, by having ice or hot water available, as the case may be, in accordance with the instructions of the manufacturer. Enclosures shall be provided for the grout such that, until it has set, its temperature will be in the range 15-27 °C. Shields to protect the grout from the sun and from hot winds shall be provided by the Contractor when so ordered.

PMG-4.2 Formwork

Formwork for grouting shall comply with the applicable requirements of Subclause 5.2 of SANS 1200 G: CONCRETE (STRUCTURAL). Forms shall be caulked where necessary. Adequate clearance between forms and bedplates shall be provided to enable the grout to be worked into place.

- PMG-4.3 **Mixing** (all free-flowing grouts except epoxy grouts)**
- The grout shall be mixed to a homogeneous uniform mixture and delivered ready for placing at a temperature between 15 °C and 25 °C.
- The materials and water shall be mixed in a mortar mixer for at least 3 minutes. In the case of small jobs, the grout shall be thoroughly mixed by hand, the entire mass being turned over enough times to ensure even distribution of the components.
- The mixing shall be done as close as possible to the place(s) where the grout is to be placed. No more grout shall be mixed at any one time than can be placed in a period of 20 minutes. After the grout has been mixed it shall not be retempered by the addition of water.
- PMG-5 **APPLICATION****
- PMG-5.1 **Grouting** (all free-flowing grouts except epoxy grouts)**
- The grout shall be placed quickly and continuously to avoid the undesirable effects of over-working. (These effects are segregation, bleeding, and breaking-down of initial set.) The method of placement shall be subject to approval. The means of placing the grout shall be such that the grout will completely fill the space to be grouted, will be thoroughly compacted, will be free of air pockets, and will have evenly distributed contact over an area in excess of 80 % or, in the case of expanding grout, 95 % of the bearing area of the item to be supported.
- Wherever practicable, grout shall be placed from one side only and where this is not practicable, care shall be taken to ensure that any entrapped air is released.
- After the grout has taken its initial set,
- (a) the forms shall be removed;
 - (b) excess grout shall be so cut away as to leave a smooth and neatly finished job;
 - (c) except where the grout is intended to provide resistance to side thrust, all edges shall be trimmed at 45° to the vertical, from the bottom edge of the bedplate; and
 - (d) all excess grout on or about the bedplates shall be removed.
- Damage to paintwork, if any, shall be repaired within 24 hours. Packing plates, shims, and other levelling devices shall remain in position.
- PMG-5.2 **Dry-packed grout** (standard dry sand and cement grout)**
- Dry-packed grout shall have a minimum compressive strength at 28 days of 20 MPa. The quantity of water added after placing shall be kept to a minimum consistent with placing conditions, and the cement, sand and, where applicable, pea gravel proportions by mass shall be as follows:
- (a) Where the clearance between bedplate and foundation is 25 mm or less : 1 part of portland cement, and 2 parts of sand;
 - (b) Where the clearance exceeds 25 mm : 1 part of portland cement, 1 part of sand, and 1 part of pea gravel.
- Dry-packed grout shall be rammed by means of tamping rods against formwork placed along three sides of the bedplate.
- PMG-5.3 **Non-shrink grout with metallic aggregate****
- The manufacturer's instructions shall be observed when non-shrink grout with metallic aggregate is used.

Where the clearance between the bedplate and the foundation is less than 50 mm a sand-based mix shall be used. Where the clearance exceeds 50 mm the Engineer may order a mix with a base of sand plus pea gravel to be used.

PMG-5.4 Expanding grout with powdered aluminium additive

The manufacturer's instructions shall be observed when an expanding grout with powdered aluminium additive is used.

Where the clearance between the bedplate and the foundation is less than 25 mm, a sand-based mix shall be used.

Where the clearance exceeds 25 mm the Engineer may order a mix with a base of sand plus pea gravel to be used.

Each batch shall be mixed for at least 6 minutes after the powdered aluminium has been added. Where a ready-mixed grout is used, the powdered aluminium shall be added at the placing site and the batch mixed as specified in PMG-4.3 above. Grout shall be placed within 45 minutes after the addition of the powdered aluminium.

The Contractor shall not use powdered aluminium additive when the ambient temperature is below 5 °C.

PMG-5.5 Epoxy grout (epoxy mortar type only)

The manufacturer's instructions shall be observed when an epoxy grout is used.

PMG-6 TESTING

The Contractor shall, where so ordered, carry out a site test for each grouting procedure and each grouting gang to be used. The tests shall be carried out on a dummy bedplate similar in configuration to that which is to be grouted, but not exceeding 1 m² in area unless otherwise ordered. When the dummy bedplate is dismantled, the underside shall show a minimum grout contact area of 80 % with reasonably even distribution of the grout over the surface grouted except that, in the case of expanding grout, the minimum grout contact area shall be 95 %. The test shall show evidence of good workmanship and materials and the results shall be to the satisfaction of the Engineer.

The Contractor shall, when so ordered, make standard test cubes from various grout mixtures and subject them to compression tests to determine whether the specified strength has been achieved. Test procedures shall comply with the relevant requirements of Subclauses 7.2.1 - 7.2.3 of SANS 1200 G.

PMG-7 MEASUREMENT AND PAYMENT

Payment for grouting of machine bases and structural bedplates is included in the prices tendered for mechanical equipment to be installed. In the case of nominated subcontracts the Principal Contractor shall be responsible for grouting of machine and equipment supplied by the Nominated Subcontractor.

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UPGRADING OF THE FILTRATION AT BAARDSKEERDESBOS

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6.1 OHS 1993 - SAFETY SPECIFICATION

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OHS 1993 SAFETY SPECIFICATION

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6.1 OHS 1993 SAFETY SPECIFICATION

6.1.1 SCOPE

This specification covers the health and safety requirements to be met by the Contractor to ensure a continued safe and healthy environment for all workers, employees and subcontractors under his control and for all other persons entering the site of works.

This specification shall be read with the Occupational Health and Safety Act (Act No 85 and amendment Act No 181) 1993, and the corresponding Construction Regulations 2003, and all other safety codes and specifications referred to in the said Construction Regulations.

This safety specification and the Contractor's own Safety Plan as well as the Construction Regulations 2003, shall be displayed on site or made available for inspection by all workers, employees, inspectors and any other persons entering the site of works.

6.1.2 DEFINITIONS

For the purpose of this contract the following shall apply:

- (a) **"Employer"** where used in the contract documents and in this specification, means the Employer as defined in the General Conditions of Contract and it shall have the exact same meaning as **"client"** as defined in the Construction Regulations 2003. **"Employer"** and **"client"** is therefore interchangeable and shall be read in the context of the relevant document.

- (b) **"Contractor"**, wherever used in the contract documents and in this specification, shall have the same meaning as **"Contractor"** as defined in the General Conditions of Contract.

In this specification the terms **"principal contractor"** and **"contractor"** are replaced with **"Contractor"** and **"subcontractor"** respectively.

- (c) **"Mandatory"**, wherever used in the contract, includes an agent, a contractor or a subcontractor for work, but without derogating from his status in his own right as an employer or user.

For the purpose of this contract the Contractor will, in terms of the agreement contemplated in Section 37(2) of OHS 1993, be the mandatory, responsible to comply with all provisions of OHS 1993 and the Construction Regulations 2003.

- (d) **"Engineer"** where used in this specification, means the Engineer as defined in the General Conditions of Contract. In terms of the Construction Regulations the Engineer may act as agent on behalf of the Employer (the client as defined in the Construction Regulations).

6.1.3 TENDERS

The Contractor shall submit the following with his tender:

- (a) a documented Health and Safety Plan as stipulated in Regulation 5 of the Construction Regulations. The Safety Plan must be based on the Construction Regulations 2003 and will be subject to approval by the Employer;
- (b) a declaration to the effect that he has the competence and necessary resources to carry out the work safely in compliance with the Construction Regulations 2003;
- (c) a declaration to the effect that he made provision in his tender for the cost of the health and safety measures envisaged in the Construction Regulations.
- (d) Failure to submit the foregoing with his tender, will lead to the conclusion that the Contractor will not be able to carry out the work under the contract safely in accordance with the Construction Regulations.

6.1.4 NOTIFICATION OF COMMENCEMENT OF CONSTRUCTION WORK

After award of the contract, but before commencement of construction work, the Contractor shall, in terms of Regulation 3, notify the Provincial Director of the Department of Labour in writing if the following work is involved:

- (a) the demolition of structures and dismantling of fixed plant of height of 3,0 m or more;
- (b) the use of explosives;
- (c) construction work that will exceed 30 days or 300 person-days;
- (d) excavation work deeper than 1,0 m; or
- (e) working at a height greater than 3,0 m above ground or landings.

The notification must be done in the form of the pro forma included as Annexure A in the Construction Regulations (a copy is attached to this safety specification as Annexure 3)

A copy of the notification form must be kept on site, available for inspection by inspectors, Employer, Engineer, employees and persons on site.

6.1.5 RISK ASSESSMENT

Before commencement of any construction work during the construction period, the Contractor shall have a risk assessment performed and recorded in writing by a competent person. (Refer Regulation 7 of the Construction Regulations 2003).

The risk assessment shall identify and evaluate the risks and hazards that may be expected during the execution of the work under the contract, and it shall include a documented plan of safe work procedures to mitigate, reduce or control the risks and hazards identified.

The risk assessment shall be available on site for inspection by inspectors, Employer, Engineer, subcontractors, employees, trade unions and health and safety committee members, and must be monitored and reviewed periodically by the Contractor.

6.1.6 APPOINTMENT OF EMPLOYEES AND SUBCONTRACTORS

a) Health and Safety plan

The Contractor shall appoint his employees and any subcontractors to be employed on the contract, in writing, and he shall provide them with a copy of his documented Health and Safety Plan, or relevant sections thereof. The Contractor shall ensure that all subcontractors and employees are committed to the implementation of his Safety Plan. To this end the Employer, or the Engineer or Agent on his behalf, will, in terms of Regulations 4(1)(d) and 5(3)(c), carry out audits on a regular basis to ensure that the Contractor as well as any subcontractors in his employ, do implement the Contractor's Safety Plan as well as the Employer's Safety Specifications in accordance with the Construction Regulations.

b) Health and safety induction training

The Contractor shall ensure that all employees under his control, including subcontractors and their employees, undergo a health and safety induction training course by a competent person before commencement of construction work. No visitor or other person shall be allowed or permitted to enter the site of the works unless such person has undergone health and safety training pertaining to hazards prevalent on site. The Employer or the Engineer on his behalf, will carry out audits from time to time to ensure compliance by the Contractor.

The Contractor shall ensure that every employee on site shall at all times be in possession of proof of the health and safety induction training issued by a competent person prior to commencement of construction work.

6.1.7 APPOINTMENT OF SAFETY PERSONNEL

a) Construction Supervisor

The Contractor shall appoint a full-time Construction Supervisor with the duty of supervising the performance of the construction work. [Refer Regulation 6(1)].

He may also have to appoint one or more competent employees to assist the construction supervisor where justified by the scope and complexity of the works.

b) Construction safety officer

Taking into consideration the size of the project and the hazards or dangers that can be expected, the Contractor shall appoint in writing a full-time or part-time Construction Safety Officer if so decided by the Inspector of the Department of Labour. The Safety Officer shall have the necessary competence and resources to perform his duties diligently. [Refer Regulation 6(2)]

Provision will be made in the schedule of quantities to cover the cost of a dedicated construction safety officer appointed after award of the contract if so ordered by the Engineer.

c) Health and safety representatives

In terms of Sections 17 and 18 of the Act (OHSA 1993) the Contractor, being the employer in terms of the Act for the execution of the contract, shall appoint a health and safety representative whenever he has more than 20 employees in his employment on the site of the works. The health and safety representative must be selected from employees who are employed in a full-time capacity at a specific workplace.

The number of health and safety representatives for a workplace shall be at least one for every 100 employees.

The function of the health and safety representative(s) will be to review the effectiveness of health and safety measures, to identify potential hazards and major incidents, to examine causes of incidents (in collaboration with his employer, the Contractor), to investigate complaints by employees relating to health and safety at work, to make representations to the employer (Contractor) or inspector on general matters affecting the health and safety of employees, to inspect the workplace, plant, machinery etc. on a regular base, to participate in consultations with inspectors and to attend meetings of the health and safety committee.

d) Health and safety committee

In terms of Sections 17 and 18 of the Act (OHSA 1993) the Contractor (as employer), shall establish one or more health and safety committee(s) where there are two or more health and safety representatives at a workplace. The persons selected by the Contractor to serve on the committee shall be designated in writing.

The function of the health and safety committee shall be to hold meetings at regular intervals, but at least once every three months, to review the health and safety measures on the contract, to discuss incidents related to health and safety with the Contractor and the inspector, and to make recommendations regarding health and safety to the Contractor and to keep record of recommendations and reports made by the committee.

e) Competent persons

In accordance with the Construction Regulations the Contractor has to appoint in writing **competent persons** responsible for supervising construction work on each of the following work situations that may be expected on the site of the works.

- a. Risk assessment and induction training as described in Regulation 7 of the Construction Regulations;
- b. Fall protection as described in Regulation 8;
- c. Formwork and support work as described in Regulation 10;
- d. Excavation work as described in Regulation 11;
- e. Demolition work as described in Regulation 12;

- f. Scaffolding work as described in Regulation 14;
- g. Suspended platform operations as described in Regulation 15;
- h. Batch plant operations as described in Regulation 18;
- i. Construction vehicle and mobile plant inspections on a daily basis by a competent person as described in Regulation 21(1);
- j. Control of all temporary electrical installations on the construction site as described in Regulation 22.
- k. Stacking and storage on construction sites as described in Regulation 26; and
- l. Inspections of fire equipment as described in Regulation 27.

A competent person may be appointed for more than one part of the construction work with the understanding that the person must be suitably qualified and able to supervise at the same time the construction work on all the work situations for which he has been appointed.

The appointment of competent persons to supervise parts of the construction work does not relieve the Contractor from any of his responsibilities to comply with **all** requirements of the Construction Regulations.

6.1.8 RECORDS AND REGISTERS

In accordance with the Construction Regulations the Contractor is bound to keep records and registers related to health and safety on site for periodic inspection by inspectors, the Engineer, the Employer, trade union officials and subcontractors and employees. The following records and registers must be kept on site and shall be available for inspection at all times.

- a) A copy of the OHS Act 1993 Construction Regulations 2003;
- b) A copy of the Client's Health and Safety Specification;
- c) A copy of the Contractor's Health and Safety Plan (Regulation 4);
- d) A copy of the Notification of Construction Work (Regulation 3);
- e) A health and safety file in terms of Regulation 5(7) with inputs by the Construction Safety Officer [Regulation 6(7)];
- f) A copy of the risk assessment described in Regulation 7;
- g) A full protection plan and the corresponding records of evaluation and training of employees working from elevated positions as described in Regulation 8;
- h) Drawings pertaining to the design of structures [Regulation 9(3)] and formwork and support work structures [Regulation 10(d)];
- i) Pronouncement of the safety of excavations must be recorded in a register to be kept on site [Regulation 11(3)(h)];
- j) A copy of the certificate of the system design for suspended platforms [Regulation 15(3)];
- k) A notice must be affixed around the base towers of material hoists to indicate the maximum mass load, which may be carried at any one time by material hoists [Regulation 7(5)].
- l) Maintenance records of material hoists and inspection results must be kept in a record book to be kept on site [Regulation 17(8)];
- m) A record of any repairs to or maintenance of a batch plant must be kept on site [Regulation 18(9)];
- n) A warning notice must be displayed in a conspicuous manner when and wherever an explosive powered tool is used [Regulation 19(2)];
- o) A register for recording of findings by the competent person appointed to inspect construction vehicles and mobile plant [Regulation 21(1)(j)].

6.1.9 CONTRACTOR'S RESPONSIBILITIES

For this contract the Contractor will be the mandatory of the Employer (Client), as defined in the Act (OHSA 1993), which means that the Contractor, as employer in his own right in respect of the contract, will be responsible for all the duties and obligations of an employer as set out in the Act (OHSA 1993) and the Construction Regulations 2003.

Before commencement of work under the contract, the Contractor shall enter into an agreement with the Employer (Client) to confirm his status as mandatory (employer) for the contract under consideration. A pro forma agreement is attached to this specification as Annexure 2.

The Contractor's duties and responsibilities are clearly set out in the Construction Regulations 2003, and are not repeated in detail but some important aspects are highlighted hereafter, without relieving the Contractor of any of his duties and responsibilities in terms of the Construction Regulations. Safety reminders in the form of a checklist of some of the more important aspects of safety as related to personnel on site, must be displayed at a prominent position at the site (see Annexure 1: Safety on the Site of Works).

(a) Contractor's position in relation to the Employer (Client) (Regulation 4)

Section 4 of the Regulations by implication requires that the Contractor shall at all times liaise closely with the Employer, or the Engineer on behalf of the Employer, to ensure that all requirements of the Act and the Regulations are met and complied with.

(b) The Principal Contractor and Contractor (Regulation 5)

The Contractor for the contract under consideration is the equivalent of "Principal Contractor" as defined in Regulation 2(b) of the Construction Regulations, and he shall comply with all the provisions of Regulation 5.

Any subcontractors employed by the Contractor must be appointed in writing, setting out the terms of the appointment in respect of health and safety. An independent subcontractor shall however provide and demonstrate to the Contractor a suitable, acceptable and sufficiently documented health and safety plan before commencement of the subcontract. In the absence of such a health and safety plan the subcontractor shall undertake in writing that he will comply with the Contractor's safety plan, the health and safety specifications of the Employer and the Construction Regulations 2003.

(c) Supervision of construction work (Regulation 6)

The Contractor shall appoint the safety and other personnel and employees as required in terms of Regulation 6 and as set out in paragraph 7 above. Appointment of those personnel and employees does not relieve the Contractor from any of the obligations under Regulation 6.

(d) Risk assessment (Regulation 7)

The Contractor shall have the risk assessment made as set out in paragraph 7 above before commencement of the work, and it must be available on site for inspection at all times. The Contractor shall consult with the health and safety committee or health and safety representative(s) etc. on a regular basis to ensure that all employees, including subcontractors under his control, are informed and trained by a competent person regarding health hazards and related work procedures.

No subcontractor, employee or visitor shall be allowed to enter the site of works without prior health and safety induction training, all as specified in Regulation 7.

(e) Fall protection (Regulation 8)

Fall protection, if applicable to this contract shall comply in all respects with Regulation 8 of the Construction Regulations.

(f) Structures (Regulation 9)

The Contractor will be liable for all claims arising from collapse or failure of structures if he failed to comply with all the specifications, project specifications and drawings related to the structures, unless it can be proved that such collapse or failure can be attributed to faulty design or insufficient design standards on which the specifications and the drawings are based.

In addition the Contractor shall comply with all aspects of Regulation 9 of the Construction Regulations.

(g) Formwork and support work (Regulation 10)

The Contractor will be responsible for the adequate design of all formwork and support structures by a competent person.

All drawings pertaining to formwork shall be kept on site and all equipment and materials used in formwork, shall be carefully examined and checked for suitability by a competent person.

The provisions of Regulation 10 of the Construction Regulations shall be followed in every detail.

(h) Excavation work (Regulation 11)

It is essential that the Contractor shall follow the instructions and precautions in the Standard Specifications and Project Specifications as well as the provisions of the Construction Regulations to the letter as unsafe excavations can be a major hazard on any construction site. The Contractor shall therefore ensure that all excavation work is carried out under the supervision of a competent person, that inspections are carried out by a Professional Engineer or Technologist, and that all work is done in such a manner that no hazards are created by unsafe excavations and working conditions.

Supervision by a competent person will not relieve the Contractor from any of his duties and responsibilities under Regulation 11 of the Construction Regulations.

(i) Demolition work (Regulation 12)

Whenever demolition work is included in a contract, the Contractor shall comply with all the requirements of Regulation 12 of the Construction Regulations. The fact that a competent person has to be appointed by the Contractor, does not relieve the Contractor from any of his responsibilities in respect of safety of demolition work.

The Contractor's attention is especially drawn to subsections (9) and (10) of Regulation 12, which read as follows:

"(9) Where the risk assessment indicates the presence of asbestos, the Contractor shall ensure that all asbestos-related work is conducted in accordance with the provisions of the 'Asbestos Regulations' promulgated by Government Notice R.155 of 10 February 2002, as amended.

(10) Where the risk assessment indicates the presence of lead, the Contractor shall ensure that all lead-related work is conducted in accordance with the provisions of the Lead Regulations' promulgated by Government Notice R.236 of 28 February 2002, as amended."

(j) Tunnelling (Regulation 13)

The Contractor shall comply with Regulation 13 wherever tunnelling of any kind is involved.

(k) Scaffolding (Regulation 14)

The Contractor shall ensure that all the provisions of Regulation 14 of the Construction Regulations are complied with. [Note : Reference in the Regulations to "Section 44 of the Act" should read "Section 43 of the Act"]

(l) Suspended platforms (Regulation 15)

Wherever suspended platforms will be necessary on any contract, the Contractor shall ensure that copies of the system design issued by a Professional Engineer are submitted to the Engineer for inspection and approval. The Contractor shall appoint competent persons as supervisors and competent scaffold erectors, operators and inspectors and ensure that all work related to suspended platforms are done in accordance with Regulation 15 of the Construction Regulations.

(m) Boatswain's chairs (Regulation 16)

Where boatswain's chairs are required on the construction site, the Contractor shall comply with Regulation 16.

- (n) Material Hoists (*Regulation 17*)
Wherever applicable, the Contractor shall comply with the provisions of Regulation 17 to the letter.
- (o) Batch plants (*Regulation 18*)
Wherever applicable, the Contractor shall ensure that all lifting machines, lifting tackle, conveyors, etc. used in the operation of a batch plant shall comply with, and that all operators, supervisors and employees are strictly held to the provisions of Regulation 18. The Contractor shall ensure that the General Safety Regulations (Government Notice R1031 of 30 May 1986), the Driven Machinery Regulations (Government Notice R295 of 26/2/1988) and the Electrical Installation Regulations (Government Notice R2271 of 11/10/1995) are adhered to by all involved.
In terms of the Regulations, records of repairs and maintenance shall be kept on site.
- (p) Explosive powered tools (*Regulation 19*)
The Contractor shall ensure that, wherever explosive-powered tools are required to be used, all safety provisions of Regulation 19 are complied with.
It is especially important that warning notices are displayed and that the issue and return of cartridges and spent cartridges be recorded in a register to be kept on site.
- (q) Cranes (*Regulation 20*)
Wherever the use of tower cranes becomes necessary, the provisions of Regulation 20 shall be complied with.
- (r) Construction vehicles and mobile plant (*Regulation 21*)
The Contractor shall ensure that all construction vehicles and plant are in good working condition and safe for use, and that they are used in accordance with their design and intended use. The vehicles and plant shall only be operated by workers or operators who have received appropriate training, all in accordance with all the requirements of Regulation 21.
All vehicles and plant must be inspected on a daily basis, prior to use, by a competent person and the findings must be recorded in a register to be kept on site.
- (s) Electrical installation and machinery on construction sites (*Regulation 22*)
The Contractor shall comply with the Electrical Installation Regulations (Government Notice R2920 of 23 October 1992) and the Electrical Machinery Regulations (Government Notice R1953 of 12 August 1993). Before commencement of construction, the Contractor shall take adequate steps to ascertain the presence of, and guard against dangers and hazards due to electrical cables and apparatus under, over or on the site.
All temporary electrical installations on the site shall be under the control of a competent person, without relieving the Contractor of his responsibility for the health and safety of all workers and persons on site in terms of Regulation 22.
- (t) Use of temporary storage of flammable liquids on construction sites (*Regulation 23*)
The Contractor shall comply with the provisions of the General Safety Regulations (Government Notice R1031 of 30 May 1986) and all the provisions of Regulation 23 of the Construction Regulations to ensure a safe and hazard-free environment to all workers and other persons on site.
- (u) Water environments (*Regulation 24*)
Where construction work is done over or in close proximity to water, the provisions of Regulation 24 shall apply.

- (v) Housekeeping on Construction sites (Regulation 25)
Housekeeping on all construction sites shall be in accordance with the provisions of the environmental Regulations for workplaces (Government Notice R2281 of 16 October 1987) and all the provisions of Regulation 25 of the Construction Regulations.
- (w) Stacking and storage on construction sites (Regulation 26)
The provisions for the stacking of articles contained in the General Safety Regulations (Government Notice R1031 of 30 May 1986) as well as all the provisions of Regulation 26 of the Construction Regulations shall apply.
- (x) Fire precautions on construction sites (Regulation 27)
The provisions of the Environmental Regulations for Workplaces (Government Notice R2281 of 16 October 1987) shall apply.

In addition the necessary precautions shall be taken to prevent the incidence of fires, to provide adequate and sufficient fire protection equipment, sirens, escape routes etc. all in accordance with Regulation 27 of the Construction Regulations.
- (y) Construction welfare facilities (Regulation 28)
The Contractor shall comply with the construction site provisions as in the Facilities Regulations (Government Notice R1593 of 12 August 1988) and the provisions of Regulation 28 of the Construction Regulations.
- (z) Non-compliance with the Construction Regulations 2003
The foregoing is a summary of parts of the Construction Regulations applicable to all construction projects.

The Contractor, as employer for the execution of the contract, shall ensure that all provisions of the Construction Regulations applicable to the contract under consideration are complied with to the letter.

Should the Contractor fail to comply with the provisions of the Regulations 3 to 28 as listed in Regulation 30, he will be guilty of an offence and will be liable, upon conviction, to the fines or imprisonment as set out in Regulation 30.

The Contractor is advised in his own interest to make a careful study of the Act and the Construction Regulations as ignorance of the Act and the Regulations will not be accepted in any proceedings related to non-conformance to the Act and the Regulations.

6.1.10 MEASUREMENT AND PAYMENT

a. Principles

It is a condition of this contract that Contractors who submit tenders for this contract, shall make provision in their tenders for the cost of all health and safety measures during the construction process. Special reference is made to the following:

a. Safety personnel

All safety personnel and competent persons referred to in clauses 7.1 to 7.5 will normally be members of the Contractor's personnel, and no additional payment will be made for the appointment of such safety personnel.

b. Records and Registers

No additional payment will be made for the keeping of health and safety-related records and registers as described in Clause 8.

ANNEXURE 1:**SAFETY ON THE SITE OF WORKS**

The basic day-to-day requirements for safety on the site of works are listed below. Compliance with these aspects does not relieve the Contractor of any of his obligations and responsibilities detailed in Regulations 4 to 28 referred to paragraph 9 of the Safety Specification.

1. Fall protection

- (a) All unprotected openings in floors, slabs, hatchways and stairways must be adequately guarded, fenced or barricaded or similar means must be used to safeguard any person from falling through such openings;
- (b) Notices must be placed conspicuously at all openings where the possibility exists that a person might fall through such openings;
- (c) Where roof work is being performed on a construction site, the contractor shall ensure that:
 - (1) no employees are permitted to work on roofs during inclement weather conditions or if weather conditions are a hazard to the health and safety of the employees;
 - (2) prominent warning notices are to be placed where all covers to openings are not of sufficient strength to withstand any imposed loads and where fragile material exists;
 - (3) there is suitable and sufficient guard-rails or barriers and toe-boards or other similar means of protection to prevent, so far as is reasonably practicable, the fall of any person, material or equipment.

2. Formwork and support work

- (a) Provision shall be made for safe access by means of secured ladders or staircases for all work to be carried out above the foundation bearing level;
- (b) All employees required to erect, move or dismantle formwork and support work structures must be adequately trained and instructed to perform these operations safely; and

3. Excavation work

The contractor shall:

- (a) take suitable and sufficient steps in order to prevent, any person from being buried or trapped by a fall or dislodgement of material in an excavation;
- (b) not require or allow any person to work in an excavation which has not been adequately shored or braced: Provided that shoring and bracing may not be necessary where the sides of the excavation are sloped to at least the maximum angle of repose of the material to be excavated;
- (c) take steps to ensure that the shoring or bracing contemplated in (b) is designed and constructed in such a manner rendering it strong enough to support the sides of the excavation in question;
- (d) ensure that no load, material, plant or equipment is placed or moved near the edge of any excavation where it is likely to cause its collapse and thereby endangering the safety of any person unless precautions such as the provision of sufficient and suitable shoring or bracing are taken to prevent the sides from collapsing;
- (e) provide convenient and safe means of access to every excavation in which persons are required to work and such access shall not be further than 6 m from the point where any worker within the excavation is working;
- (f) have every excavation, including all bracing and shoring, inspected:
 - (1) daily, prior to each shift;
 - (2) after every blasting operation;
 - (3) after an unexpected fall of ground;

- (4) after substantial damage to supports; and
 - (5) after rain, by a competent person in order to pronounce the safety of the excavation.
- (g) where an excavation is accessible to the public or where the safety of persons may be endangered:
 - (1) adequately protect the excavation by a barrier or fence of at least one metre in height and as close to the excavation as is practicable; and
 - (2) provide warning illuminates or any other clearly visible boundary indicators at night or when visibility is poor;
- (h) place warning signs next to an excavation within which persons are working or carrying out inspections or tests.

4. Demolition work

- (a) The contractor shall not require or allow any person to work under unsupported overhanging material, which has not been adequately supported, shored or braced;
- (b) The contractor shall ensure that no material is dropped to any point, falling outside the exterior walls of the structure, unless the area is effectively protected.
- (c) Where the risk assessment indicates the presence of asbestos or lead, the contractor shall ensure that all asbestos-related work is conducted in accordance with the Asbestos Regulations promulgated by Government Notice No.R.155 of 10 February 2002, as amended, and that all lead-related work is conducted in accordance with the provisions of the, Lead Regulations promulgated by Government Notice No.R.236 of 28 February 2002, as amended.

5. Suspended platforms

- (a) The contractor shall not use or allow the use of a suspended platform, unless the design, stability and construction thereof comply with the safety standards incorporated for this purpose into these Regulations under section 44 of the Act;
- (b) The contractor shall ensure that each person on a suspended platform is provided with and wears a safety harness as a fall prevention device which must at all times, be attached to the suspended platform or to the anchorage points on the structure whilst on the suspended platform;
- (c) The contractor shall ensure that all employees required to work or to be supported on a suspended platform are physically and psychologically fit to work safely in such an environment by being in possession of a medical certificate of fitness;

6. Material hoists

- (a) The contractor shall not require or allow any person to operate such a hoist, unless the person is competent in the operation thereof.
- (b) The contractor shall not require or allow any person to ride on a material hoist.

7. Batch plants

- (a) The contractor shall ensure that all persons authorised to operate the batch plant are fully:
 - (1) ... aware of all the dangers involved in the operation thereof; and
 - (2) conversant with the precautionary measures to be taken in the interest of health and safety.
- (b) No person supervising or operating a batch plant shall authorise any other person to operate the plant, unless such person is competent to operate such machinery.

8. Cranes

The Contractor shall ensure that where tower cranes are used, that:

- (a) the tower crane operators are competent to carry out the work safely; and
- (b) the tower crane operators are physically and psychologically fit to work in such an environment by being in possession of a medical certificate of fitness.

9. Construction vehicles and mobile plant

- (a) The contractor shall ensure that all construction vehicles and mobile plant: are operated by workers who:
 - (1) have received appropriate training and been certified competent and been authorised to operate such machinery; and
 - (2) are physically and psychologically fit to operate such construction vehicles and mobile plant by being in possession of a medical certificate of fitness;
- (b) The Contractor shall furthermore ensure that:
 - (1) no person rides or be required or allowed to ride on any construction vehicle or mobile plant otherwise than in a safe place provided thereon for that purpose;
 - (2) vehicles used to transport employees have seats firmly secured and adequate for the number of employees to be carried; and
 - (3) when workers are working on or adjacent to public roads, reflective indicators are provided and worn by the workers.

10. Electrical installations and machinery on construction sites

The contractor shall ensure that: before construction commences and during the progress thereof, adequate steps are taken to ascertain the presence of and guard against danger to workers from any electrical cable or apparatus which is under, over or on the site;

11. Use and temporary storage of flammable liquids on construction sites

- (a) The Contractor shall ensure that:
 - i) where flammable liquids are being used, applied or stored at the workplace concerned, it is done in a manner that would not cause fire or explosion hazards, and that the workplace is effectively ventilated. Where the workplace cannot effectively be ventilated:
 - ii) every employee involved must be provided with a respirator, mask or breathing apparatus of a type approved by the chief inspector, and
 - iii) steps must be taken to ensure that every such employee, while using or applying flammable liquids, uses the apparatus supplied to him or her;
- (b) no person smokes in any place in which flammable liquid is used or stored, and the contractor shall affix a suitable and conspicuous notice at all entrances to any such areas prohibiting smoking;
- (c) an adequate amount of efficient fire-fighting equipment is installed in suitable locations around the flammable liquids store with the recognised symbolic signs.

12. Fire precautions on construction sites

The contractor shall ensure that smoking is prohibited and notices in this regard are prominently displayed in all places containing combustible or flammable materials.

13. Construction welfare facilities

- (a) The contractor shall, depending on the number of workers and the duration of the work, provide at or within reasonable access of every construction site, the following clean and maintained facilities:
- (1) at least one shower facility for every 15 workers;
 - (2) at least one sanitary facility for every 30 workers;
 - (3) changing facilities for each sex; and
 - (4) sheltered eating areas.
- (b) The shall also ensure that:
- (1) no horseplay between employees or aggressive or threatening behaviour by anybody is allowed on site;
 - (2) workers shall wear appropriate protective clothing for particular tasks, including protective eyewear, gloves, boots, ear protection, masks, etc. Workers shall not be allowed to wear loose clothes or footwear;
 - (3) workers executing tasks in manholes for sewer and stormwater systems shall be made aware of the existence of hazardous gasses in closed areas, and shall be issued with masks as necessary. Only specialists shall be allowed to work in gas-filled chambers;
 - (4) blasting must be done by specialists in accordance with the Explosives Act;
 - (5) workers shall not be allowed to make open fires on any part of the site, unless in designated areas approved by the health and safety manager;
 - (6) no vehicle or equipment shall be operated on site if it produces noise above 90 decibels. measured at a distance of 10 m from the unit;
 - (7) adequate signage shall be used on site to indicate:
 - non-smoking areas on the site;
 - safety exits / emergency exits from buildings under construction;
 - stairs (temporary and permanent works);
 - toilets
 - fire fighting equipment;
 - fire assembly points;
 - fire escapes;
 - overhead works;
 - areas where members of the public are not allowed; and
 - first aid facilities;
 - (8) Visitors to the site shall only be allowed to enter the site by pre-determined procedures, including safety induction training. Records of visitors shall be kept in the health and safety files.

ANNEXURE 2:**AGREEMENT IN TERMS OF SECTION 37(2) OF THE OCCUPATIONAL HEALTH AND SAFETY ACT (ACT No. 85 OF 1993)**

THIS AGREEMENT made between:
 (hereinafter referred to as "the Employer") of the one part, herein represented by :

.....
 in his capacity as

AND:

(hereinafter referred to as "the Mandatary") of the other part, herein represented by :

.....
 in his capacity as

and being duly authorised to act as Mandatary on behalf of the Contractor;

WHEREAS the Employer is desirous that certain works be constructed, viz (Quotation No.)

(title)

and has accepted a tender by the Mandatary for the construction, completion and defects correction of such works and whereas the Employer and the Mandatary have agreed to certain arrangements and procedures to be followed in order to ensure compliance by the Mandatary with the provisions of the Occupational Health and Safety Act 1993 (Act 85 of 1993);

NOW THEREFORE THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. The Mandatary shall execute the work in accordance with the contract documents pertaining to this Contract.
2. This Agreement shall hold good from its commencement date, which shall be the date on which the site is handed over to the Mandatary by an order in writing from the Engineer, to either:
 - (a) the date of the final certificate issued in terms of Clause 52(1) of the General Conditions of Contract 2004 (hereinafter referred to as "the GCC"), as applicable to this Contract, or
 - (b) the date of termination of the contract in terms of Clause 55 or clause 56 of the GCC.
3. The Mandatary declares himself to be conversant with the following:
 - (a) All the requirements, regulations and standards of the Occupational Health and Safety Act (Act 85 of 1993), hereinafter referred to as "The Act", together with its amendments and with special reference to the following Sections of The Act:
 - (i) Section 8: General duties of employers to their employees;
 - (ii) Section 9: General duties of employers and self-employed persons to persons other than employees;
 - (iii) Section 37: Acts or omissions by employees or mandataries; and
 - (iv) Sub-section 37(2) relating to the purpose and meaning of this Agreement.
 - (b) The procedures and safety rules of the Employer as pertaining to the Mandatary and to all his subcontractors.

Scope of Work

Reference No: SC 646/2009

Upgrading of the Filtration Plant at Baardskeerdersbos

4. In addition to the requirements of Clause 36 of the General Conditions of Contract and all relevant requirements of the Contract, the Mandatary agrees to execute all the works forming part of this Contract and to operate and utilize all machinery, plant and equipment in accordance with the Act.
5. The Mandatary is responsible for the compliance with the Act by all his subcontractors, whether or not selected and/or approved by the Employer.

In witness thereof the parties hereto have set their signatures hereon in the presence of the subscribing witnesses:

At for and on behalf of the **EMPLOYER** on this the
.....day of..... 20....

SIGNATURE:

CAPACITY:

WITNESSES:

SIGNATURES: (1) (2)

NAMES: (1) (2)

At for and on behalf of the **MANDATORY** on this the
.....day of.....20....

SIGNATURE:

CAPACITY:

WITNESSES:

SIGNATURES: (1) (2)

NAMES: (1) (2)

ANNEXURE 3**PRO FORMA NOTIFICATION FORM IN TERMS OF THE OCCUPATIONAL HEALTH AND
SAFETY ACT 1993 , CONSTRUCTION REGULATIONS 2003**

[This form must be completed and forwarded, prior to commencement of work on site, by all Contractors that qualify in terms of Regulation 3 of the Construction Regulations 2003, to the office of the Department of Labour]

1. (a) Name and postal address of Contractor:
.....
(b) Name and tel. no of Contractor's contact person:
.....
2. Contractor's compensation registration number:
3. (a) Name and postal address of client:
.....
(b) Name and telephone number of client's contact person or agent:
.....
4. (a) Name and postal address of designer(s) for the project:
.....
(b) Name and telephone number of designer's contact person:
.....
5. Name and telephone number of Contractor's construction supervisor on site appointed
in terms of regulation 6(1):
6. Name/s of Contractor's sub-ordinate supervisors on site appointed in terms
of regulation 6(2):
7. Exact physical address of the construction site or site office:.....
.....
8. Nature of the construction work:
.....
9. Expected commencement date:
10. Expected completion date:
11. Estimated maximum number of persons on the construction site:
12. Planned number of subcontractors on the construction site accountable to Contractor:
13. Name(s) of subcontractors already chosen:
.....
.....

SIGNED BY:

CONTRACTOR:.....

DATE:.....

CLIENT:.....

DATE:.....