C3: SCOPE OF WORK

C3: SCOPE OF WORK

Page N°

C3.1: DESCRIPTION OF WORK

C3 SCOPE OF WORK

C3.1 Description of the Works

C3.1.1 Employer's Objectives

UMkhanyakude District Municipality as Water Services Authority (WSA) and Water Services Provider (WSP) is responsible for the provision of adequate, reliable and safe water supplies to the entire region of uMkhanyakude.

UMkhanyakude District Municipality intends to augment the Water Supply to Ward 1, 2, 3, 4, 6, 7, 8 and 9 to improve the supply of potable water to the communities.

Under this Tender N° MW/71/3/2022/2023/01 Mhlathuze Water is inviting tenders for the Construction of 2 concrete reservoirs, replacement of high lift pumps and refurbishment of Hluhluwe Water Treatment Works.

C3.1.2 Overview of the Works

This project includes the construction of civil works, electrical and mechanical works.

C3.1.3 Extent of the Works

The scope and extent of the works comprises the following:

- Site establishment and the removal of all site establishment on completion of the Contract.
- Replace dysfunctional pumps
- Construction of Clearwater Balancing Tank at the Water Treatment Works
- Construction of additional storage at command reservoir site.
- Fencing of reservoir site
- Maintaining the whole of the works constructed for a period of 12 calendar months after a Certificate of Completion has been issued.

C3.1.4 Location of the Works and Access

Big5 Hlabisa ward 6,7 and 9 are situated within the uMkhanyakude District Municipality under the Big5 Hlabisa Local Municipality (KZ 274) area of jurisdiction. Co-ordinates of the approximate centre of the project area are 32°11'19.71"E and 28° 7'12.96"S

The Water Supply Scheme is located approximately 22km south-west of Hluhluwe. The Locality Plan to a scale of 1:100 000 showing the footprint of the project area is included in Section C4.4.

The site is accessible by existing gravel and tarred roads and the Contractor shall familiarise himself with the site conditions and requirements for transport of plant and materials. Under no circumstances will any claims be allowed on account of difficulties experienced with access to any part of the Works.

C3.1.5 Temporary Works

The Contractor is to allow for all temporary works required for this Contract. The Contractor shall be required to obtain the use of suitable land to establish maintain and secure his site office, workshop, storage facilities for pipes, plant, equipment, fittings, fuel, lubricants and all other materials required in the performance of this Contract, all in terms of the requirements of the Contract as described in C3 of this document and in the Environmental Management Plan enclosed in this document.

C3.1.6 Nature of Ground and Subsoil Conditions

The Contractor is to make his own assessment of the materials to be excavated from inspection and from the information available for the area.

No warranty is implied that materials over the whole site are consistent with those indicated in the trial holes, or in any report.

The Contractor may undertake any further investigations or trial excavations he may require for his tender purposes provided that the prior approval of the Engineer is obtained.

The water table may be relatively high during the summer months and provision must be made for effective draining of excavations. Most of the excavation will be on sandy soil which is mostly dominant around the project area.

C3.1.7 Employer's objectives

The Employer's objectives are to deliver public infrastructure using EPWP principles. As part of these principles the Works will be completed using labour intensive methods wherever possible.

C3.2: ENGINEERING

C3.2 Engineering

C3.2.1 Design Services and Activity Matrix

Description	Responsible Party
Works designed by	Employer
Design of Alternatives proposed (if any)	Contractor
Temporary works	Contractor
Compilation of As-Built Drawings	Engineer

C3.2.2 Employer's Design

The Employer will issue tender and construction drawings. 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 drawings are issued separately to this document.

At commencement of the Contract, the Employer/Employer's Representative shall deliver to the Contractor copies of the construction drawings and any instructions required for the Commencement of the Works. From time to time thereafter during the progress of the works, the Employer/ Employer's Representative may issue further drawings or revisions for construction purposes as may be necessary for adequate construction, completion and defects correction of the works. The work shall be carried out in accordance with the latest available revision of the drawings approved for construction.

C3.2.3 Drawings

The following drawings are applicable to the Contract and are bound separately:

Drawing N°	Drawing Title

The Contractor will be required to mark up one complete set of prints of the construction drawings with as-built information and submit these to the Employer's Agent's Representative prior to issue of the Certificate of Practical Completion.

C3.2.4 Contractor's Design

The Contractor's responsibilities for design and documentation includes, but is not necessarily limited to, the descriptions below:

C3.2.4.1 Design of Alternatives

Should the Contractor, at Tendering Stage or following appointment, propose any alternative to the Employer's design, such proposal shall only be deemed valid if it is accompanied by adequate and suitable sketches or drawings detailing the extent of the alternative and the component, sufficient to establish the means of execution the work, applicable fabrication drawings, etc. and provided that such submission is also accompanied by Method Statements, and specifications where appropriate, detailing how the Contractor proposes to go about the work from the ordering of materials, organizing of plant, steps in executing the alternative proposal, together with proposed list of personnel involved, tools, health and safety measures and measures for environmental compliance.

Such alternative shall be provided adequately in advance of the proposed work to allow for sufficient consideration and consultation and shall be subject to the Engineer's approval.

C3.2.4.2 Design of Temporary Works

The Contractor shall be responsible for the layout of his site camp, construction areas, design of the pipe yard and all temporary works, including construction access, culverts and drainage. The Contractor is also referred to the Employer's Environmental Specification in this regard.

C3.2.4.3 Other Documentation Required from Contractor

Operation and Maintenance Manual

The Contractor shall be responsible to produce the Operations & Maintenance Manual for the Works. Two draft copies of the O & M Manual shall be issued to the Engineer prior to commissioning of the Works. Before the Certificate of Practical Completion is issued (after the successful completion of the Trial Operational Period) four final copies of the final approved version of the O & M Manual shall be issued to the Engineer.

Binders with hard plastic covers and four-ring spring clip holders shall be used. Binders shall not be over-filled to allow use without damage to the contents. A spare binder shall be provided for every three used, marked with the contract information. At least one set shall contain original copies.

The manual shall be of a standard acceptable to the Engineer. Title labels which include contract number, title, location, Contractor's name as well as the equipment or fittings used together with volume number and contents shall be fixed on the front as well as the spine of the binders.

Manuals shall be in English only, with sections of equipment arranged by labelled dividing separator sheets. Where standard literature is obtained from suppliers or manufacturers, this shall be neatly photocopied in A4 size, with the applicable sections clearly marked, omitting duplicate sections in languages other than English.

Comprehensive indexes shall be included, with separate sections (with their own index) where required, as follows:

- Record (as-built) drawings referenced to the drawings list in C3.2.3.
- Fittings and equipment supplied
- A comprehensive schedule of routine maintenance for the Works.

C3.3: PROCUREMENT

C3.3 Procurement

C3.3.1 Preferential procurement procedures

C3.3.1.1 Requirements

The conditions associated with the granting of preferences, if any, and the sanctions relating to a breach of preferencing conditions are contained in the Tender Data.

C3.3.1.2 Resource standard pertaining to targeted procurement

The Employer has determined that 100% of the Contractor's unskilled labour force shall be made up from the ward or settlement in the Local Municipality area. Local labour employed on the contract shall be paid in accordance with the Civil Engineering Industry minimum wage rate for EPWP contracts and all statutory conditions of employment shall be met including registration with the Unemployment Insurance Fund

Certain construction activities have been identified for Labour Intensive Construction methods. Guideline daily rate tasks for various activities are detailed in C3.3.2. The task is calculated as 9 hours work.

C3.3.1.3 Contracts of Employment

All employees of the Contractor shall be issued with a written contract of employment which shall be signed by the Contractor and the employee. The contracts shall be in isiZulu and in English.

Contracts of employment shall incorporate, inter alias, the following:

- personal particulars;
- job title and job description;
- employment period, including any probation period, which probation period shall not exceed 13 weeks;
- hours of work, statutory holidays, vacation, sick leave;
- remuneration, including wage rates for overtime, and any monetary allowances and deductions applicable to any probationary period and the time after its satisfactory completion;
- method of payment;
- medical and any other social benefits;
- conditions precedent to termination of employment;

and shall be accompanied by a written statement of company procedures covering such matters as training, promotion and redundancy policies, procedures for dealing with grievances, disciplinary procedures, protective clothing and occupational safety, and the like.

C3.3.1.3 Induction Programme

Before starting training or regular working, all employees shall attend an induction programme at which, inter alia, methods of working, site safety procedures, environmental policies, and the employees' role in relation to them shall be addressed. The employees shall be given an introduction to the Contractor's general industrial relations policy and procedures, covering such subjects as selection for promotion and redundancy, any bonus schemes, procedures for dealing with grievances, disciplinary procedures, and the like.

C3.3.1.4 In-task Training

In-task training of the workforce is a general responsibility of the Contractor to ensure that his workforce is sufficiently skilled, Health and Safety aware and Environmentally compliant as per the Employer's Environmental Specification. The Contractor shall provide in-task training of local labour during the construction of the works and at this own cost. In-task training shall consist of training and guidance of team leaders, assistants, and labour in those construction activities where the labour is engaged. The in-task training shall cover all training and guidance required to ensure that the leaders and labour are able to carry out the project tasks in accordance with the requirements of the project specification.

All personnel involved in construction shall also be trained in the Employer's Environmental Management System. The in-task training shall be carried out by the Contractor's skilled personnel.

C3.3.2 Labour Intensive Construction Methods

It is the intention of the Employer to enhance local employment as far as possible. Certain tasks have been identified for the mandatory use of Labour Intensive Construction Methods. Apart from the identified tasks the Contractor shall plan his works in general to make maximum use of labour intensive methods in preference to the use of plant where appropriate.

The tasks identified for mandatory use of Labour Intensive Construction Methods are:

- Pipeline trench excavation in soft material for trench depths not exceeding 1,5m depth;
- Placement of bedding cradle and bedding blanket;
- Backfilling of pipe trenches

Classification of materials for hand excavation shall be as per Annex B of SANS 1921 Part 5 (Tables B.1 & B.2). For excavation by hand, daily task rates shall be as per Table B.3 (Annex B) of SANS 1921 Part 5 ('Typical production per 6 hour task'), where the task rate varies according to classification of soft material (Soft Class 1, Soft Class 2 & Soft Class 3) and depth of excavation (Refer also PSDB 5.4.1.). Cases of disagreement in classification of excavation shall be referred to the Engineer, whose decision is final. A task for placing bedding and backfilling by hand (excluding compaction) may be agreed at 7,0m³/day.

The adherence to the application of Labour Intensive Construction will be monitored by the Community Liaison Officer (CLO) and will be reported on via the monthly income generation reports. Machine excavation shall be used where the classification of excavation is 'intermediate' or 'hard' and for excavation of pipe trenches beyond 1,5m in depth. Machine excavation may also be used where the community reports that the work is too hard for manual labour. The CLO will be the liaison person in this respect.

C3.3.3 Subcontracting

This sub-section covers the subcontracting of specialist work at the Contractor's choice, mandatory sub-contracting to local SMMEs and the use of selected subcontractors identified by the Employer.

C3.3.3.1 Subcontracting at Contractor's Choice

Subcontracting of specialized portions of the work is permitted in principle up to a maximum of twenty five percent (25%) in total of the approved contract value. Should the Tenderer wish to employ Sub-Contractors of his own choice for part of the works, this is to be clearly indicated in Form Y of the Returnable Schedules, showing the full names and addresses of all proposed Subcontractors for which approval of the Engineer is sought and stating the section of the works that each will be handling.

Subsequent to contract award, the written approval of the Employer shall be required prior to the engagement of any subcontractor not proposed in the tender and accepted by the Employer. The appointment of subcontractors shall only be formalized on the basis of the

presentation of a suitable and compliant subcontracting agreement in the CIDB format or other acceptable format.

C3.3.3.2 Selected Subcontractors

This sub-section covers specialist work for which the Employer retains the right to identify the specialised service provider to be used. The areas of work to which this may apply are described below.

(i) Telemetry Installation;
(ii) Mechanical and Electrical Installation;

C3.3.3.2 Mandatory Subcontracting in terms of the PPPFA

The Contractor will subcontract no less than 30 percent of the total value of the works. The 30% value of the works excludes the works to be done by the selected subcontractors. The work will be subcontracted to subcontractors who reside within the UMkhanyakude District Municipal Area. The main aim is to transfer skills.

The contractor will be required to provide mentoring and management of the subcontractor throughout the duration of their works. The contractor will be reimbursed for this function under the item provided in the Bill of Quantities. The contractor will take full responsibility of the works done by the subcontractors. Some of the aspects of mentorship will include:

- Pricing/calculating a rate
- Business Management
- Basic contractual matters
- Transfer of some construction skills
- Calculation of quantities
- Preparing payment certificates

Monthly measurement and payment will be according to the following guideline:

- Submission of payment certificate by the Contractor, the submission from the Contractor shall include the signature of the Sub-contractor indicating agreement with the measurements and rates applicable to the work undertaken by the Sub-contractor.
- Payment to the Contractor in line with the timeframes give in the Conditions of Contract
- The Subcontractor is then to be paid within reasonable time but no later than 5 working days after the Main Service Provider has been paid by the Employer
- The submission from the Contractor must include a schedule that clearly shows the following:
  - Total Contract Sum
  - Total amount payable to CPG Partner/s excluding current month
  - Amount payable to CPG Partner for current month
  - % split of Total amount payable to Main Service Provider and CPG Partner/s

C3.4: CONSTRUCTION

C3.4 Construction

C3.4.1 Applicable Specifications

C3.4.1.1 Standard Specifications

The standard specifications on which this contract is based are the South African Bureau of Standards Standardised Specifications for Civil Engineering Construction SABS 1200 as listed in C3.6 of the Scope of Work. The various SANS specifications referred to in this document are listed in C3.6 and the Contractor is advised to obtain them from Standards South Africa (a division of SABS) in Pretoria.

The Standardised Specifications (SABS 1200) must be read in conjunction with the new SANS 1921 family of standards. In case of any discrepancy or conflict between the two, the SABS 1200 specification shall take precedence and shall govern.

Refer also to the Preface on interim situation until full suite of SANS 2001 Series of Specifications is available, on the first page of the Project Specification.

The term “project specifications” appearing in any of the SABS 1200 Standardised Specifications is deemed to be equivalent to the term “scope of work” in SANS Specifications.

The variations and additions to the standard specifications are prefixed PS and take precedence over the SABS Standardised Specification.

Where a particular specification is in conflict with either the variations and additions to standardized specifications or the SABS Standardised Specifications, the particular specifications shall take precedence.

C3.4.1.2 Applicable National and International Standards

Wherever possible items and materials for construction of the works shall comply with the relevant South African Bureau of Standards Specifications and with the British Standards where these are applicable in the absence of local standards.

The Contractor, when using materials conforming to a Standard Specification shall, if called upon, furnish the Engineer with certificates of tests showing that the materials do so conform.

C3.4.1.3 Particular / Generic Specifications

The Particular Specifications are included as C3.8 and take precedence over the Standard Specifications, but not over the Project Specifications.

C3.4.1.4 Certification by Recognised Bodies

Wherever possible items and materials for construction of the works shall comply with the relevant South African Bureau of Standards Specifications and with the British Standards where these are applicable in the absence of local standards.

The Contractor, when using materials conforming to a Standard Specification, shall if called upon furnish the Engineer with certificates of tests showing that the materials do so conform.

C3.4.2 Plant and Materials

No plant or materials will be supplied by the Employer under this contract. This will be the sole responsibility of the Contractor.

Plant and materials that are to form part of the permanent works shall be required to conform to the specifications herein. Prior to acceptance of materials on the site the Contractor shall therefore submit for prior approval details of the proposed product and manufacturer, including brochures and technical information, and including typical quality test routines and validation certificates. Rejection and replacement of materials due to lack of prior approvals shall be at the Contractor’s expense. Delay in ordering due to late submission of information to the

Engineer shall be deemed to be a delay at the Contractor' own responsibility.

Certain materials are subject to inspection at the site of the manufacturer's works by an Independent Inspection Authority appointed by the Engineer. The Contractor shall be responsible to arrange the timely attendance of the Inspection Authority. Acceptance of materials on site shall be subject to the Engineer's approval and will generally not be granted in the absence of inadequate or missing Quality Assurance information and Material Data Sheets.

The storage of plant and materials on site is the Contractor's responsibility. The Contractor shall take adequate precautions to safeguard the plant and equipment and shall be liable to remedy any defects or replace any plant and equipment damaged in the course of transport, handling and storage and in the process of incorporation in the works and testing up to the point of acceptance of the works by the Employer.

C3.4.3 Construction Equipment

No construction equipment will be supplied by the Employer under this Contract. All construction equipment required for the completion of the works shall be provided by the Contractor.

Equipment to be used on site shall be well maintained and, if road going, in possession of valid roadworthy certificates. Leaking of fuel or lubricant, or excessive or objectionable noise, or exhaust emissions shall be adequate grounds for instruction to remove the plant from the site, which removal shall be done within 24 hours.

The Contractor shall be responsible for determining the load clearance limits existing at the time and ensuring that his construction equipment does not exceed such limits. Before moving any heavy construction traffic onto highways, roads and bridges, the Contractor shall make suitable arrangements with the appropriate government authorities and obtain their approval for the passage of such traffic.

The Contractor shall not travel tracked vehicles or plant on any bituminous sealed road surface. Only rubber tyre vehicles conforming to applicable load restrictions will be permitted to use bituminous sealed roads.

The Contractor shall take note of the work activities that are subject to mandatory Labour-Intensive Construction Methods and shall make adequate allowance for hand tools and PPE sufficient to complete these work activities according to programme.

C3.4.4 Existing Services

C3.4.4.1 Known Services

The approximate positions of some of the known underground services, which may be affected by the Works, have been shown on the drawings. The Contractor will be required to contact all service owners and ascertain the location and status of all services irrespective of whether they are shown on the drawing or not.

C3.4.4.2 Treatment of Existing Services

The Contractor shall inform the Engineer of all services affected or permanently affected by the works and services shall not be exposed, re-routed or modified without the written approval of the service owner. Existing services shall be protected as required, including re-routing of traffic, hand excavation in the vicinity of buried services and strutting or otherwise supporting services that cross trenches or excavations.

C3.4.4.3 Use of Detection Equipment

Where the presence of underground services is suspected the Contractor shall use such methods as necessary, including cable detectors and/or Ground Penetrating Radar, to prevent unnecessary damage and consequent delay and cost of repair.

C3.4.4.4 Damage to Services

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 should such damage occur.

C3.4.5 Site Establishment

C3.4.5.1 Services and Facilities Provided by the Employer

C3.4.5.1.1 Contractor's Site Camp & Depot (Read with SANS 1921 - 1: 2004 Clause 4.14)

The Employer will not provide sites for the Contractor's establishment but will indicate the possible site(s) for the Contractor's site camp and pipe yard, if required. It shall be the Contractor's responsibility to obtain permission for the use of the land and to negotiate the terms of use with the owner(s).

No housing is available for the Contractor's employees and the Contractor shall make his/her own arrangements to house his/her employees and to provide all necessary transport arrangements. No informal housing or squatting will be allowed.

C3.4.5.1.2 Water Supply

Water for domestic use is available from Hluhluwe Town and at some settlements. The Contractor shall make his own arrangements for any water he/she may require. Any extension of time due to delays resulting from this facility will not be granted. The Contractor shall be solely responsible for all the necessary costs for payments for this facility.

The Contractor shall utilise potable water from the above-mentioned places for domestic purposes and concrete mixing only. The Contractor shall make his/her own arrangements for the supply of water for other construction purposes from local rivers, stream, dams etc. No additional payments will be made to procure water for construction purposes and it shall be deemed to be covered by the relevant items in the tendered rates.

C3.4.5.1.3 Electricity

The Contractor shall make his own arrangements regarding the supply of electricity. The Contractor will also be required to make his own arrangements and pay all the requisite connection and consumption charges for whatever temporary power supplies he may require for his/her use on the site. No direct payment will be made for the provision of power. The cost thereof shall be deemed to be included in the rates and amounts tendered for the various items of work for which this service is required, or in the Contractor's preliminary and general items as the case may be.

C3.4.5.1.4 Telecommunication Services

The Contractor is to provide his own telephone facilities on site. Two cellular phones will be required for the use of the Engineer and his representative for the duration of the Contract. An item has been included in the Bill of Quantities to cover the costs.

C3.4.5.1.5 Sanitary Facilities

No waterborne sewer lines exist in the Settlements. The Contractor shall provide adequate ablution and toilet facilities for all workers on site. All latrines shall confirm to the requirements of the Local Authority. All sanitary fees and charges due under the Local Authority, or State Health Regulations, or bylaws shall be paid by the Contractor. Throughout the process of the contract, all latrines shall be maintained by the Contractor in a clean, sanitary condition to the

satisfaction of the Engineer. The use of pit latrines will be permitted.

C3.4.5.2 Facilities provided by the Contractor

C3.4.5.2.1 Site Establishment

C3.4.5.2.1.1 Buildings

Possible sites for establishment will be indicated at the pre-tender site visit. The Contractor shall determine his space requirements and shall be responsible to negotiate permission and terms of use of the site(s) in agreement with the respective landowner(s). The Contractor must not cut down or damage any trees nor make any excavation without the written permission of the Engineer and will be required to restore the site to its original condition on completion of the works.

The Contractor shall provide and maintain at his own cost all sheds and housing necessary for the convenience of his workmen and for the accommodation and proper protection of his erection or other equipment from damage or loss. These are to be erected only on sites which shall have been approved by the Engineer and they shall be removed as soon as they are no longer required for the works; and the site thereof restored to its original condition and the ground left clean and sanitary.

C3.4.5.2.1.2 Sanitary Facilities

The Contractor shall provide the necessary ablution facilities at his camp site and the site of the works for the use of his employees. Separate toilet facilities shall be available for the sole use of the Engineer or his representative(s). Buildings and fencing are to be neat and presentable and the surrounding areas must at all times be kept in a neat, clean and orderly condition. All buildings and latrines shall be in accordance with the Local and National Health regulations and shall be kept in a clean, sanitary condition.

C3.4.5.2.1.3 Security

The Contractor shall provide security watchmen to safeguard the works, plant, personnel and materials for the contract, as he deems fit, at no extra cost to the Employer. The Contractor must ensure that all his employees as well as the employees of his Sub-contractors are able to identify themselves as members of the construction team.

C3.4.5.2.1.4 Dealing with Water and Disposal of Waste

The Contractor shall pay special attention to the management and disposal of all water on site from whatever source. It is essential that all completed works or parts thereof are kept dry and properly drained. Claims for any delay and for repair of damage caused to the works as a result of the Contractor's failure to properly manage rain and surface water, will not be considered.

The Contractor shall dispose of solid waste by burying it at the approved municipal dump yard or spoil site(s) that has (have) been approved for such use by the Local Municipality. Buried waste shall be covered up on a daily basis and the Contractor shall rehabilitate the site prior to practical completion. The Contractor shall dispose and cover up all surplus and unsuitable material in spoil areas that have been approved by the Local Municipality. He/she shall be responsible for all arrangements necessary to obtain access to such dump wards and spoil sites.

The Contractor's Establishment shall not be considered as being complete until such time as the facilities to be provided for the Engineer are fully in place. (Refer PSAA & PSAB)

C3.4.5.2.2 Equipment for Determination of Labour-Intensive Excavation (Read with SANS 1921 - 5: 2004)

The Contractor shall provide and maintain in good condition a Dynamic Cone Penetrometer (DCP) and all associated equipment for the determination of areas for Labour-Intensive excavation methods as per PSDB5.4 and for the classification of excavated materials as per Annex B of SANS1921 Part 5.

C3.4.5.2.3 Accommodation of Employees (Read with SANS 1921 - 1: 2004 clause 4.14.)

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

No informal housing or squatting will be allowed.

C3.4.5.2.3 Establishment of Pipe Yards

The Contractor shall be responsible for the logistics of pipe deliveries for determining his/her storage requirements for pipes and the points of delivery, whether to the site camp, or along the pipeline routes. The Contractor shall secure adequate land for purposes of pipe delivery and storage and shall be responsible for any damages to pipes during the transport, offloading, storage and further handling of the pipes.

The location and size of a pipe yard(s) is at the Contractor's discretion. However, as a guide for site layout purposes, an average of 400 mm should be allowed between parallel pipes, the end to end gap between pipe stacks should be 5 m and the gap between pipes and the perimeter fence should be at least 6 m which includes the 5 m wide firebreak.

Steel pipes should be stored off the ground and secured from rolling using suitable dunnage, such as sandbags. Stacking of pipes should only be considered according to the manufacturer's recommendations.

To lessen the risk of fire damage the whole site where pipes are stored should be cleared of bushes and shrubs, subject to the Environmental Specification and Environmental Management Plan, and the grass on the site where pipes are stored to be cut to a height of no more than 25 mm and maintained at a height not exceeding 50 mm.

The Contractor shall provide the necessary supply of drinking water and ablution facilities at his pipe yard(s) and pipe storage areas for the use of the security guards and his employees.

C3.4.5.2.4 Storage and laboratory facilities

No storage facilities will be available or provided by the Employer and the Contractor is to make suitable arrangements to deliver materials as and when required for construction purposes and when called for by the Engineer, whether such call be issued on or after the delivery date offered by the Tenderer.

The Contractor shall arrange for process control testing to be undertaken by a Laboratory to be approved by the Engineer.

A Provisional Sum has been be allocated for in the Bill of Quantities for the Engineer's acceptance control testing.

C3.4.5.2.5 Water

Water for human consumption shall be required to conform to SABS 241 for potable water. The Contractor shall be required to make his own arrangements for the supply and treatment of water to required quality standards.

C3.4.5.2.6 Electricity

The Contractor shall make his own arrangements concerning the supply of electricity. The Contractor will be required to pay all the requisite connection and consumption charges for whatever temporary electricity supplies he may require for his use on the site. No direct payment will be made for the provision of electricity. The cost thereof shall be deemed to be included in the rates and amounts tendered for the various items of work for which this service is required, or in the Contractor's preliminary and general items as the case may be.

C3.4.5.2.7 Telecommunication Services

The Contractor is to provide his own telephone facilities on site. Two cellular phones will be required for the use of the Engineer and his representative for the duration of the Contract. An

item has been included in the Bill of Quantities to cover the costs of the Engineer's cellular phone calls.

C3.4.5.2.8 Vehicles and Equipment

The Contractor shall provide for the exclusive use of the Engineer's Representative and his staff one or more vehicles as required by the Engineer.

C3.4.6 Permits and Way Leaves

The Contractor shall obtain the necessary approvals and shall be required to comply with the authorities, service providers, and landowners' / occupiers' requirements at all times.

The Contractor will be required to take cognisance of, and comply with, the general wayleave and 'permission to occupy' requirements of the authorities, service providers and landowners / occupiers during the construction of the works.

The Contractor will be required to confirm that permission has been granted and that the authorities, service providers, landowners/ occupiers and all affected parties have been informed of the Contractor's intentions before commencing with work on each property.

C3.4.7 Alterations, Additions, Extensions and Modifications to Existing Works

The Contractor must satisfy himself/ herself that the layout of the existing services, structures and plant is compatible with the proposed works, and must advise the Engineer of any conflicts.

Alterations to existing services will require prior written authorisation by the Service Provider(s).

C3.4.8 Water for Construction Purposes

The Contractor shall make his own arrangements for water for construction purposes.

C3.4.9 Survey Control and Setting Out of the Works

The Contractor will be responsible for the setting out of the Works.

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 are disturbed by the Contractor or his/her employees, the Contractor shall have them replaced by a registered land surveyor at his/her own cost.

C3.5: MANAGEMENT

C3.5 Management

C3.5.1 Management of the works

C3.5.1.1 Applicable SANS 1921 Specifications

The following SANS 1921 Construction and Management requirements for works standards and associated specification data are applicable:

SANS 1921-1	General Engineering and Construction Works
SANS 1921-2	Accommodation of Traffic on Public Roads
SANS 1921-5	Earthworks Activities Which are to be Performed by Hand
SANS 1921-6	HIV/AIDS Awareness

C3.5.1.2 Particular and Generic Specifications

The applicable Particular Specifications and Generic Specifications are included in section C3.8 of this specification.

C3.5.1.3 Specification Data

The specification data applicable to these SANS 1921 standards is as follows:

Standard	Clause	Essential Data
SANS 1921-1	4.1.7	The requirements for drawings, information and calculations for which the Contractor is to be responsible are detailed in the project specifications.
	4.2.1	The responsibility strategy assigned to the Contractor for the works is A.
	4.2.2	The Structural Engineer for the valve chambers and concrete reservoir is Mvulo Consulting Engineers.
	4.3.1	The planning, programme and method statements are to comply with the following: 1) The programme shall be prepared in bar (Gantt) chart form, preferably using a project management software tool such as *Microsoft Projects/Excel* and shall be issued to the Engineer in both hard copy and electronic format. The programme shall be structured to cover all items of work including all work to be done by sub-contractors and shall clearly indicate the critical path 2) The programme must clearly show the intermediate milestone dates to be achieved taking the indicative construction sequences into account. 3) The programme shall be updated whenever the circumstances of the work execution change and whenever instructed by the Engineer. Each revision of the programme shall be marked with a sequential revision number. The Contractor's programme shall be subject to approval by the Engineer. 4) Method statements shall be prepared by the Contractor for any procedures proposed by the Contractor for use in the contract as well as in accordance with the requirements of the project specifications.
	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 Quality Assurance (QA) system on site. The Contractor's QA system shall be open to audit by the Engineer to verify that adequate independent checks and tests are being carried out and to ensure that the Contractor's own control is sufficient to identify any possible quality problems which could cause a delay or failure.

Standard	Clause	Essential Data
SANS 1921-1		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 Engineer or the Engineer's Representative to act as foreman or surveyor.
	4.5	The Contractor will be required to verify the accuracy of all survey control provided on the drawings or in the form of beacons previously placed on the site. Prior to setting out, the Contractor shall also check the invert levels of all existing tie-in channels, manholes, pipes etc. against those provided on drawings and immediately report any inconsistencies to the Engineer in writing. The Contractor shall be held directly responsible for any errors in setting out of the works arising from use of the survey control or existing invert levels provided.
	4.5.1	It is important that, during construction, the Contractor checks all levels from time to time and satisfies himself as to their accuracy prior to placing of concrete as no concrete work will be accepted where tolerances have been exceeded, particularly where it interferes with the hydraulics of the flow through the works. The maintenance of gravelled temporary deviations and existing gravel roads used for construction shall include the watering of roads daily in the dry season for reduction of dust.
	4.6	An item has been included in the Bill of Quantities to cover all work associated with dealing with water.
	4.12.2	The samples of materials, workmanship and finishes that the Contractor is to provide and deliver to the Employer are: 1) Pipes and Jointing methods 2) Pipe coatings and corrosion protection of pipes and fittings 3) Pipe bedding materials 4) Concrete aggregate 5) Concrete sand 6) Reinforcing The fabrication drawings that the Contractor is to provide and deliver to the Employer are those for the reservoir ladders and any prefabricated items that the Contractor proposes to use in the permanent works.
	4.14.3	The office accommodation, equipment, accommodation for site meetings and other facilities for use by the Employer and his agents are: 1) Site offices as per SABS 1200 AB (refer PSAB). 2) Meeting room, minimum floor area 30 square metres. 3) Two covered parking bays. 4) Safety helmets, gumboots and other necessary safety equipment for the sole use of the Employer and his Agents 5) Survey equipment as per PSAB 4.2 6) No testing laboratory is required on site for use by the Engineer
	4.14.5	Toilet facilities are required for the Employer and his agents.
	4.14.6	The requirements for the provision and erection of sign boards are: 1) As per SABS 1200 AB and C4
SANS 1921-1	4.17.1	The requirements for the termination, diversion, or maintenance of existing services are:

Standard	Clause	Essential Data
		1) Support in-situ of existing water mains up to and including DN 200 crossing pipe trench 2) Deviation of small diameter water house connection pipes and fittings. 3) Deviation and relocation of electrical power cables as domestic power connections – work is to be carried out by the responsible utility owner under the overall co-ordination of the Contractor. Provisional sums are provided for this purpose. 4) Temporary deviation and accommodation of traffic
	4.17.2	Where public services must be interrupted on account of the works, it shall be the Contractor's responsibility, in conjunction with the appropriate Authority to ensure that all users affected by the interruption are given due and sufficient notice of the date, time and duration of the interruption.
	4.17.3	Services which are known to exist on the site are: 1) Overhead telephone lines and electricity lines 2) Water pipelines 3) Stormwater pipes and catchpits 4) Roads and tracks 5) Box culverts and concrete causeways The approximate positions of some of the known underground services, which may be affected by the Works, have not been shown on the drawings. The exact location or number or existence of these services cannot be guaranteed and the Contractor will be required to confirm the locations and status of all services with all service owners irrespective of whether they are shown on the drawing or not.
	4.17.4	The requirements for detection apparatus are: underground cable and pipe detectors during proving for pipe trench excavation. Where services are found the Engineer must be notified immediately so that a decision can be made regarding re-alignment, relocation or protection of said services. The Contractor shall on no account effect such adjustments without the prior consent of the Engineer
	4.17.5	If unknown services are found undamaged, they shall then be deemed to be known services with the provisions pertaining to known services becoming applicable.
	4.17.6	Where a service has been located and exposed, the Contractor shall take every care in ensuring that the excavation containing the service is barricaded and protected against collapse and that the service is adequately protected against damage. Should the existing service become damaged by the Contractor or any third party due to negligence on part of the Contractor, then the cost of its repair along with any consequential costs shall be borne by the Contractor.
	4.17.7	Existing known services or services that have been proved by the Contractor, which are damaged by the Contractor, shall be repaired by the service provider and all costs of the repair shall be borne by the Contractor.

Standard	Clause	Essential Data
SANS 1921-1	4.18	The additional health and safety requirements of the Employer are as specified in the Health and Safety Specification included in C3.8 of this document.
as	4.18.2	The site office area, pipe yard, the servitude/working strip and all other construction zones shall be fenced off to prevent unauthorized entry to the site. Gates shall be provided by the Contractor as required for construction access purposes. The Contractor shall be held responsible for the control of access at these gates at all times as well as to the worksite during removal and re-erection of fencing. No other opening in the fence shall be permitted and the Contractor shall be responsible for monitoring the fencing on a daily basis and repairing any such opening within the same day that it is detected. Notices in two official languages (English and IsiZulu) shall be attached to the fence where appropriate to indicate that the site is for personnel employed on the Contract only and that unauthorised entry is forbidden. The temporary fencing shall comprise 2m high Bonnox 4 x 4 Mesh fencing, Bonnox pattern 1972/4, with straining posts and straining wires as required and according to supplier's directions and with mesh spacing not exceeding 100mm in both the vertical and horizontal directions. Chevron tape shall be interwoven in a zig zag pattern from the top to the bottom of the fence thereby clearly marking off the working area. In proximity to residential areas the Engineer may specify the addition of plastic square mesh to the temporary fencing, or equivalent method, to acts as a childproof barrier to prevent child access to pipe trenches.

Standard	Clause	Variations
SANS 1921-1	4.1.10	Where reference is made to "SANS 2001", substitute with "SABS 1200"

Standard	Clause	Additional Clauses
SANS 1921-1	4.4	The Contractor is required to set up and maintain a Quality Management system and Quality Assurance process. The requirements are detailed elsewhere in this document.
	4.5	The Contractor is required to submit Method Statements for specific items of work as identified in this specification and wherever the Contractor proposes his own approach or method of working. In order to avoid delays to work Method Statements must be submitted well in advance of the proposed work (at least 10 working days or such suitable time as agreed with the Engineer's Representative) and are subject to the approval of the Engineer.
	4.6 (e)	The Contractor is to ensure that stormwater runoff or any groundwater seepage is controlled by means of temporary earthworks, cofferdams, pumping equipment, well-pointing, de-watering equipment etc. to keep the works free of water.
	4.6 (f)	Dealing with all water during construction from whatever source will include for by-pass arrangements for dealing with all possible flows whether or not the existing flow path is being interfered with during installation of pipework.
SANS	4.7.4	No blasting will be permitted within 10 m of any structure, pipeline or

Standard	Clause	Additional Clauses
1921-1		service unless the Contractor can satisfy the Engineer that his proposed blasting methods and controls are such that no damage will be caused to the adjoining structure, pipeline or service. The Contractor will be required to provide equipment for and take vibro-recordings at no additional cost to the Employer.
	4.8.1	The Contractor shall be responsible for protection from damage to any structures or services that might be affected by the excavations or works.
	4.8.2	Notwithstanding whatsoever special construction methods, equipment or materials are used by the Contractor to protect the structure or service from damage, all work will be measured for payment on the assumption that normal excavation had been carried out and the Contractor shall therefore make allowance for the additional costs in his tendered rates.
	4.9.5	The provision of security for the Contractor's site establishment, plant and personnel at all times is the sole responsibility of the Contractor and no claims for payment for additional security measures taken during the contract will be entertained.

Standard	Clause	Variations
	4.9.6	The Contractor is to comply with the Environmental Management Plan and Employer's Environmental Management Specification included as a Particular Specification in Section C3.8.
	4.17.8	The Contractor shall so carry out all his operations as not to encroach on, or interfere with, trespass on, or damage adjoining land, buildings, properties, road structures, pipelines, places and things, in the vicinity of the Works and outside of the site boundary.

Standard	Clause	Essential Data
SANS 1921-2	4.3.2	The Contractor shall design all temporary culverts.

Standard	Clause	Variations
SANS 1921-2	4.3.2	**Variations** The Contractor shall be responsible for the design of all temporary deviations.

Standard	Clause	Essential Data
SANS 1921-5	4.2.1	The means of determination of method of Excavation (i.e. by hand or machine excavaton) shall be as per PSDB5.4.1. The depth of trenches which are to be excavated by hand is less than or equal to 1,5m and providing that the ground is stable.

Standard	Clause	Essential Data
SANS 1921-6	4.2.1 a)	A qualified service provider is one that appears on the list of recommended service providers, which is available from all regional offices of the Department of Public Works.
	4.2.1 a)	The HIV & AIDS awareness programme is to be repeated at 6 monthly intervals for the duration of the Contract (including the initial one at the start of the Contract).

Standard	Clause	Variations
SANS 1921-6	4.3.2	The HIV & AIDS Awareness Champion and the Employer's representative shall certify the report and schedule described in 4.3.1 whenever a claim for payment is issued to the Employer.

Standard	Clause	Additional Clauses
SANS 1921-6	4.1 f)	Appointing an HIV & AIDS Awareness Champion within 14 days of site handover from amongst the workers (which could include the Community Liaison Officer). The champion should be able to speak, read and write English, speak and understand the local languages spoken by the Workers and shall be on site at all stages of the construction period. The Contractor shall ensure that the Awareness Champion has been trained by the Service Provider on basic HIV & AIDS information, the support services available and has the necessary skills to handle questions regarding the HIV & AIDS programme in a sensitive and confidential manner.
		The Awareness Champion shall be responsible for: • Liaising with the Service Provider to assist in organising awareness workshops • Filling condom dispensers and monitoring condom distribution • Handing out information booklets • Placing and maintaining posters
	4.1 g)	Provide information about the names of the closest service providers to be displayed on a poster of size not smaller than A2.
	4.2.3 c)	Understand and communicate the purpose of voluntary HIV & AIDS testing and counselling.
	4.2.3 d)	Recognise the importance of caring for people living with HIV & AIDS and be familiar with the various treatments available, including treatment of opportunistic infections.
	4.2.3 e)	Understand and communicate the rights and responsibilities of those living with HIV & AIDS in the workplace and the importance of non-discrimination.

Standard	Clause	Additional Clauses
	5	**Sanctions** In the event that the Contractor fails to satisfy the requirements of this specification, the Employer may apply sanctions which include the rejection of claims for payment as being incomplete or the withholding of completion certificates (interim or final).

C3.5.2 Planning and Programming

C3.5.2.1 Preliminary Programme

The Tenderer shall include with his tender a preliminary programme on the prescribed form to be completed by all Tenderers. 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.

In drawing up his programme, the tenderer is to take into account the following:

The Contractor shall allow time for co-ordination of piping tie-ins to the existing system.
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.

C3.5.2.2 Construction Programme (GCC 2015 Clause 5.6)

For the purpose of this clause, "construction programme" means the Programme of the Works to be submitted in terms of Clause 5.6 of the General Conditions of Contract 2015 and used to plan and organise the work.

On award of the Contract, the successful Contractor is to prepare a full construction programme. The programme is to show all activities and highlight which are critical path activities. With reference to GCC 2015 Clause 5.6.1 the Initial Programme must be provided prior to commencement of the works. Adjusted Programmes of Works may be required from time to time as stated in GCC 2015 Clause 5.6.1.

Also note that the successful contractor will be required to allow standing time of 2 months for completion of geohydrological studies (sitting of new boreholes, drilling, yield and quality testing) before commencement of the works. No construction work can take place before all the studies are completed and results are made available to the Engineer by the selected subcontractors.

In addition to the Construction programme, when directed, the Contractor shall promptly furnish a detailed sub-programme of the construction programme for particular sections of the Permanent Works.

C3.5.2.3 Software Application for Programming

The construction programme shall be prepared using Excel Format (*.xls/.xlsx) or Projects Format (*.mpp) and showing at least the minimum detail as described in Clause C3.5.3 of the Standard Conditions of Contract.

C3.5.3 Sequence of the Works

The Contractor can choose his own sequence of construction, bearing in mind the availability of water for the water-tightness testing of reservoirs and the pressure testing of pipelines. However, the Contractor must practice progressive reinstatement and remediation in line with the Particular Specification for Environmental Management and EMP.

On no account will spoil, rubble, materials, equipment or unfinished operations be allowed to accumulate in such a manner as to unnecessarily impede the activities of others or impact on the environment. In the event of this occurring, the Employer shall have the right to withhold payment for as long as may be necessary in respect of the relevant Works in the areas concerned without prejudicing the rights of others to institute claims against the Contractor on the grounds of unnecessary obstruction.

Finishing and tidying must not be deferred to the end of the Contract. All finishing and tidying shall be carried out to the best advantage of the project as a whole, and in close co-operation with other parties and residents.

C3.5.4 Community Liaison Officer

The Employer will provide the services of a Community Liaison Officer (CLO) for the duration of the Contract.
The primary role of the CLO will be liaison and facilitation of communication which shall include inter alia:

- Assist in all aspects related to the recruitment of local labour, and advise them of their rights
- Act as liaison between the Contractor and community on the application of Labour Intensive Construction Methods as set out in this document
- Act as a source of information for the community and the Ward Councilors on issues related to the Contract
- Liaise with a Project Committee, as anticipated in the EMP, for community representation
- Keep the Contractor advised on community issues
- Keep the Contractor advised on any issues pertaining to local security (where applicable)
- Assist in setting up any meetings/negotiations with affected parties
- Keep a diary and record details of labour/community issues that may arise
- Monitor and report on general Health and Safety issues on site
- Assist in HIV/AIDS awareness programmes
- Attend contract site meetings and report on labour/community issues

The CLO shall have no authority to issue any instructions to the Contractor. The CLO shall be neutral to all parties and endeavour to remain impartial should any conflict arise. The CLO will be paid on a monthly basis at a rate of R7000-00 per month,

Responsibility for identifying a pool of suitable labour shall rest with the CLO, although the Contractor shall have the right to choose from the pool. The Contractor (and Sub-contractors) shall have the right to determine the total number of labourers required at any one time, which may vary throughout the contract.

The Contractor shall have the right to replace labour that is not performing adequately and the replacement of any labourer shall be done in conjunction with the CLO.

Local labour employed on the contract shall be paid in accordance with the Civil Engineering Industry minimum wage rate for EPWP contracts and all statutory conditions of employment shall be met.

C3.5.5 Methods & Procedures

C3.5.5.1 Management & Disposal of Water (Read with SANS 1921 - 1: 2004 Clause 4.6)

The Contractor shall pay special attention to the management and disposal of water and stormwater on the site. It is essential that all completed works or parts thereof are kept dry and properly drained. Claims for delay and for repair of damage caused to the works as a result of the Contractor's failure to properly manage rain and surface water, will not be considered.

C3.5.5.2 Disposal of Spoil or Surplus Material (Read with SANS 1921 - 1: 2004 Clause 4.10)

The Contractor will be responsible for the disposal of material and making all arrangements in connection therewith. The Contractor shall dispose of all surplus and unsuitable excavated material in spoil areas selected by himself. Any areas used for spoiling shall be approved by the Local Authority.

C3.5.5.3 Length of Trenches not Backfilled and not Rehabilitated

The recommended maximum length of open trenches at any one time is 2000 m in greenfield areas and 400m in residential areas in order to limit the safety risk to surrounding communities.

In areas immediately adjoined by residential properties the Contractor will not be permitted to excavate any new pipe trenches once the maximum limit for open trench in a particular area has been reached, without the permission of the Environmental Control Officer. A maximum of three working fronts for pipelaying will be permitted.

C3.5.5.4 Length of Pipeline not Pressure Tested

The maximum length of pipeline which is not pressure tested that will be allowed at any given time during construction is 2000 m. The Contractor will not be permitted to excavate any new pipe trenches once the maximum limit for "un-pressure tested" pipeline has been reached unless otherwise authorised by the Engineer.

C3.5.5.5 Determination of Method of Excavation

Trenches for pipelines shall be excavated by either mechanical means or by hand, determined as follows:

Trial holes of minimum dimensions 1,0 x 1,0 m shall be excavated by hand along all pipeline routes at 50 m intervals ahead of the Contractor's programme. The trial holes shall be 1 m deep or less if intermediate or hard rock material is encountered. An item has been included in the Schedule of Quantities to cover this work.

If intermediate or hard rock material is encountered in the top 1 m of excavation at such trial holes, then excavation may be deemed to be carried out by mechanical means, the length of such excavation determined on the basis of other trial hole findings.

If soft material only is encountered at such trial holes, then excavation may be deemed to be carried out by hand up to a maximum depth of 1,5m, the length of such excavation determined on the basis of other trial hole findings. The consistency of the material shall be determined as per Table 1 of SANS 1921-Part 5 and the Classification of excavated material shall be as per Annex B of SANS 1921-Part 5 (Tables B.1 & B.2).

If intermediate or hard rock material is encountered in those stretches set aside for hand excavation on the basis of the trial hole findings, then the Contractor may be allowed to remove the intermediate or hard rock material by mechanical or whatever means, the rate for which is to include for backfilling and re-excavating (if necessary).

C3.5.5.6 Determination of Haul Distances

The Contractor shall be responsible to plan his work and logistics so as to minimise his costs of haul of imported materials and spoil. No payment will be made for overhaul on this contract unless provision is made for in specific items.

C3.5.6 Quality Plans and Control

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 Quality Assurance (QA) system on site. The Engineer will audit the Contractor's quality assurance (QA) system on a regular basis to verify that adequate independent checks and tests are being carried out and to ensure that the Contractor's own control is sufficient to identify any possible quality problems which could 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 Engineer or the Engineer's representative to act as foreman or surveyor.

C3.5.7 Management of the Environment

(Read with SANS 1921-1: 2004 clause 4.19, the Environment Particular Specification and the Environmental Management Plan

The Contractor shall pay special attention to the following:

(a) Clearing of Vegetation

The Contractor shall not destroy, remove or clear trees, timber or shrub to any extent greater than that approved. The Contractor shall not carry out any activity outside the areas defined for clearing unless otherwise approved by the Environmental Control Officer.

(b) Soil Erosion

The quality of topsoil in stockpiles will be maintained by measures including minimising contamination from other materials, minimizing stockpiling periods and prevention of soil erosion by surface runoff or wind. Monitoring for erosion and soil erosion risk will be undertaken regularly to ensure that any erosion that occurs is mitigated as soon as possible.

(c) Risk of Faunal Injury and Death

The trenches will be kept open for the minimum period necessary to undertake the works. Temporary fencing or barriers will be placed along the trenches in all populated areas and in areas that are likely to be used as crossing points along the corridor.

(d) Pollution Prevention

With particular regard to Sanitation, Solid Waste Facilities, Fuels, Hazardous Substances and other Liquid Pollutants as elaborated in the Particular Specification for Environmental Management.

(e) Rehabilitation

The Contractor is to ensure that the site and its surrounds are rehabilitated to the condition in which they were prior to commencement of construction activities.

(f) Working in watercourses

Cofferdams shall be constructed around trenched areas in watercourses using sealed plastic bags filled with sand and means of conveyance must be provided for the flow of water to bypass the excavation. The flow of rivers is not to be restricted.

C3.5.8 Accommodation of Traffic on Public Roads Occupied by the Contractor (Read with SANS 1921 – 1: 2004 clause 4.13 and SANS 1921 – 2: 2004)

C3.5.8.1 General

The Contractor will be responsible for the safe and easy passage of public traffic past and on sections of roads of which he/she has occupation or where work has to be done near traffic.

Accommodation of traffic, where applicable shall comply with SANS 1921-2: 2004: Construction and Management Requirements for Works Contracts, Part 2: Accommodation of Traffic on Public Roads occupied by the Contractor. The Contractor shall obtain this specification from Standards South Africa if accommodation of traffic will be involved on any part of the construction works.

C3.5.8.2 Basic Requirements

The travelling public shall have the right of way on public roads, and the Contractor shall make use of approved methods to control the movement of his equipment and vehicles so as not to constitute a hazard on the road.

The Contractor shall ensure that all road signs, barricades, delineators, flagmen and speed controls are effective and that courtesy is extended to the public at all times.

Failure to maintain road signs, warning signs or flicker lights, etc, in a good condition shall constitute ample reason for the Engineer to suspend the work until the road signs, etc, have been repaired to his satisfaction.

The Contractor may not commence constructional activities affecting existing roads before adequate provision has been made to accommodate traffic in accordance with the requirements of this document and the South African Road Traffic Signs Manual.

The Contractor shall design, construct and maintain all temporary access and haul roads to the various working areas. The Contractor shall construct and maintain all temporary drainage works necessary for temporary deviations.

The Contractor shall provide and grant access to persons whose properties fall within or adjoin the area in which he/she is working.

C3.5.8.3 Traffic Safety Officer

Where warranted by traffic conditions on or near the site, the Contractor shall nominate a suitable member of his/her staff as at Traffic Safety Officer to be responsible for the arrangement and maintenance of all the measures for the accommodation of traffic for the duration of the project. Duties of the Traffic Safety Officer shall be as set out in SANS 1921 Part 2 and shall also be in compliance with the Occupational Health and Safety Act No 85 of 1993 and the Construction Regulations 2014, including the Particular Safety Specification.

C3.5.10 Accredited Skills Training

Apart from the Contractor's own in-task training of his workforce it is the intention of the Employer that Accredited On-Site Skills Training will also be provided under this contract. Candidates for On-Site Skills Training will be identified by the community from individuals who are undergoing, or who have undergone, training at an Accredited Training Providers for skills and learnership. This list will be reviewed by the Employer prior to notifying the Contractor in writing of the names of candidates to be accepted for Accredited Skills Training. The Contractor shall employ such candidates according to his full and normal conditions of employment for unskilled labour for the duration of training. The ISD shall appoint an Accredited Skills Training Facilitator subject to the Employer's approval who will conduct the training, which will take place adjacent to the worksite in a suitable area to be provided by the Contractor for the purpose of training and set aside for that purpose. The Contractor shall be required to provide an office space for theoretical instruction as well as construction materials for practical training.

It is intended that Skills Training will be provided in any or all of the following disciplines:

- Trench Excavation and Supervision;
- Pipelaying;
- Steel Fixing;
- Formwork and Concreting;
- Basic Construction Hand;
- Bricklaying and block laying;
- Finishing Hand;
- Task Based Labour Administration
- Understanding the Scope of Works and Engineer's Specifications;
- Labour Recruitment and Management;
- Contractor's Responsibilities and Requirements;
- Payroll Management and Implementation;
- Basic Tender and Contract Pricing
- Community Liaison and Facilitation

The Contractor shall provide the workspace and office space for training and shall pay the

training candidates at the normal rate of pay for unskilled labour for the duration of the training. The Contractor shall also pay the fees and charges of the accredited trainer according to the agreed scale. The cost of Accredited On-Site Training is an item in the Bill of Quantities and the cost is to be reclaimed by the Contractor via the Payment Certificate.

Upon completion of the training by the Contractor the employment shall terminate and the Contractor shall not be obliged to keep the trained personnel in his employ. However, he may re-employ candidates on an individual basis by mutual agreement.

Apart from the Contractor's own in-task training of his workforce it is the intention of the Employer that Accredited On-Site Skills Training will also be provided under this contract. The Contractor has management responsibilities in this regard and this Accredited On-Site Skills Training is further described in Particular Specification PT. A payment item is included in the Bill of Quantities where the costs of providing this training will be recovered by the Contractor. The item shall be deemed to cover all the Contractor's costs in relation to provision of training as outlined in this section and in Particular Specification PT

C3.5.11 Testing, Completion, Commissioning and Correction of Defects

C3.5.11.1 Process Control Testing

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.

C3.5.11.2 Acceptance Control Testing

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 paid for in the contract, but tests that failed to confirm compliance with the specifications, will be for the account of the Contractor.

C3.5.12 Recording of Weather

The Contractor shall be permitted to take his own rainfall measurements on site subject to the Engineer's approval, but access to the measuring gauge(s) shall be under the Engineer's control. The Contractor is to provide and install all the necessary equipment for accurately measuring the rainfall as well as to provide, erect and maintain a security fence plus gate, padlock and keys at each measuring station, all at his own cost.

C3.5. 13 Key Personnel

The Contractor's Key Personnel for this contract shall be the Contracts Director, Contracts Manager, Contracts Site Agent, Health & Safety Officer, Site Supervisor, Engineer, Technician and Foreman.

C3.5.14 Management meetings

The Contractor and such other persons as may be nominated by the Engineer shall be required to attend periodic site meetings, the date and place for which will be set by the Engineer in consultation with the Employer and Contractor.

The main purpose of the site meetings will be to review and discuss progress and programme, and all persons attending the site meetings must be empowered to act on behalf of the organisations they represent.

C3.5.15 Forms for Correct Administration

C3.5.15.1 Report on Employment Generation

The Contractor shall provide to the Engineer, monthly, in an EPWP reporting template form approved by the Engineer, a detailed breakdown of his personnel (Contractor's staff and labour such as skilled and semi-skilled) days worked, and those of any Sub-contractors employed at the Site to conform with EPWP reporting requirements.

The breakdown shall also include details of the following:

- employee name and ID number
- gender and age group
- job category, with skill classification, or speciality;
- job title;
- number of employees in each job category or with that job title;
- trainees in each job category;
- classification of employees by origin (local/imported)
- Daily register
- Proof of Payment
- **Payment Certificate will not be honoured if the Project is not Reporting on the EPWP**

C3.5.15.2 *Contractual*

Payment Certificate must be accompanied with the EPWP monthly report template.

C3.5.15 Electronic Payments

Payment of employees by electronic funds transfer will be permitted provided that the bank or financial institution that is proposed for the transfer of funds is adequately represented in Newcastle and Dannhauser, including the provision of ATM facilities.

C3.5.17 Daily Records

The Contractor is to provide a triplicate site diary book, which is to be kept on site, for the purpose of keeping daily records in respect of work performed on the site and all significant events. The Engineer's Representative will keep the top copy on his records and the Contractor will take the middle copy and the third copy will remain in the site diary book which will be kept on site for the duration of the Contract.

C3.5.18 Bonds and Guarantees

Requirements for a Performance Guarantees are indicated in section T.2. The original guarantee document will be retained by the Employer and will be released in accordance with Clause 6.2 of GCC 2015.

C3.5.19 Payment Certificates

The Contractor shall submit invoices at monthly intervals in terms of Clause 6.10.1 of GCC 2015 in respect of works completed during the preceding period and materials on site. The work shall be measured according to the format of the Bill of Quantities and measurements should be taken together with the Engineer's Representative and are subject to agreement as to the status of work completed. The Contractor will submit his invoice, together with invoices and other supporting documentation to the Engineer in terms of GCC 2015 Clause 6.10.2. The Engineer will process the Contractor's invoice within 7 days of receipt (refer GCC 2015 Clause 6.10.3 & 6.10.4) to produce a Payment Certificate and will deliver this to the Employer.

The Payment Certificate will be scrutinised by the Employer prior to payment within 30 days of receipt of the Certificate from the Engineer, provided that the date of submission is such as to comply with the Employer's payment cycle as notified to the Contractor. The Contractor must

ensure that, allowing for the time allowed for processing Certificates by the Engineer, his invoice is submitted in good time to allow for the payment cycle to be met.

The Contractor's tendered rates for the relevant items in the Bill of Quantities shall include full compensation for all possible additional costs which may arise from this, and no claims for extra payment due to inconvenience as a result of the modus operandi will be considered.

C3.5.20 Permits

The Employer requires no special permits for the Contractor's personnel other than those required by the statutory authorities. This includes, but is not necessarily limited to, Work and Residence permits for non-South African nationals, Blasting Certificate for the use of explosives and permits from the Department of Energy and Mineral Affairs in respect of mining and exploitation of natural resources including sand and aggregates.**C3.5.21 Proof of Compliance with the Law**

The Contractor is referred to the Returnable Schedules in Section T.2. The Contractor shall be required to maintain evidence of the continued validity of all aspects to which he has witnessed compliance at the time of submission of his tender, as well as any permits required by nature of his operation. The Contractor will be deemed to have granted the Employer the right of inspection of such documentation in the possession of the Contractor at any time as well as to make his own independent investigations where necessary.

C3.5.22 Insurance Provided by the Employer

The Employer is not providing Principal Controlled Insurance for the works that are the subject of this contract.

C3.5.23 Health and Safety

C3.5.23.1 Health and Safety Requirements and Procedures

C3.5.23.1.1 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 No 85 and Amendment Act No 181 of 1993, and the OHSA 1993 Construction Regulations 2014 issued on 07 February 2014 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 by executing the Agreement form C1.5 included in Section C1: Agreements and Contract Data.

C3.5.23.1.2 Health and Safety Specifications and Plans to be submitted at Tender Stage

(a) Employer's Health and Safety Specification

The Employer's Health and Safety Specification is included in this document as part of the Particular Specifications.

Contractors are to take note of the aspects identified in the specification requiring attention in the pricing of the tender and in the preparation of the H&S Plan:

(b) Contractor'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 9 to 30;

(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 Sub-contractors, employees and visitors to the site, including safety training in hazards and risk areas (Regulation 7);

(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 Manager, the Construction Health and Safety Officer and other competent persons he intends to appoint for the construction works in terms of Regulation 8 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 2014.

The Contractor's Health and Safety Plan must take into account the residential nature of the surrounding area and particularly the presence of children.

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.

C3.5.23.1.3 Cost of Compliance with the OHSA 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.

C3.5.23.2 Protection of the Public

The Contractor is alerted to the fact that the construction site traverses residential communities. The Contractor in all his planning is to take account of the potential hazard to residents, particularly children and is to take every precaution to avoid injury.

The site office area, pipe yard, the servitude/working strip and all other construction zones shall be fenced off to prevent unauthorized entry to the site. Gates shall be provided by the Contractor as required for construction access purposes. The Contractor shall be held responsible for the control of access at these gates at all times as well as to the worksite during removal and re-erection of fencing.

In populated areas and where directed by the Engineer the Contractor shall also supply, install and maintain temporary fencing on both sides of the working area (servitude) and around the perimeter of all agreed additional working areas during construction for prevention of unauthorised access and shall remove on completion of the works.

C3.5.23.3 Barricades and Lighting

Requirements for barricading and lighting are stated Clause 4.18.2 of the Contract Data

(Section C3.5.1.3, to be read in accordance with in SANS 1921-1 Clause 4.18.2) as well as under the applicable Standard Specifications for each construction activity as modified in the Project Specifications (section C3.7).

C3.5.24 Aids Awareness

C3.5.24.1 Service Provider

C3.5.24.2 Sanctions

In the event that the Contractor fails to satisfy the requirements of this specification, the Employer may apply sanctions which include the rejection of claims for payment as being incomplete or the withholding of Completion Certificates (interim or final).

C3.6: STANDARD SPECIFICATION

C3.6 Standard Specifications

C3.6.1 Introduction

The Standard Specifications give a general description of the requirements to be met and sets out the relevant specifications relevant to the Contract as well as other relevant and additional clauses. In certain clauses the standard 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 the project specifications.

C3.6.2 General

All materials, and components used in the manufacture and fabrication of plant to be supplied under this Contract, shall be the best quality and suitable for the purposes for which they are intended.

C3.6.3 Quality Management

C3.6.3.1 Applicable Quality Assurance Standards

The Tenderer shall provide a co-ordinated and formally documented statement of his quality management system, including quality management objectives, policies, organisation and procedures, for the compulsory implementation of SABS 0157 Code of Practice for Quality Management Systems, Part III. The same applies to Part II of the said Code of Practice which must be implemented on certain selected items only. However, although Part II will not be implemented in all instances it will not exempt the Contractor of compliance with the quality requirements laid down in the tender documents. Monitoring and control by the Engineer may be done at any time on any material.

The Contractor shall submit with his tender an assessment report on his quality management and quality control system issued by an independent Quality Assurance Authority approved by the Engineer. The inspection on which this assessment report is based shall have taken place not more than 12 months prior to the closing date for this tender.

Responsibility for and all associated costs of compliance with this sub-clause shall rest with the Contractor.

C3.6.3.2 Quality Assurance Enhancement

Should the Contractor or any of the proposed sub-contractors not comply with Sub-Clause C3.6.3.1 at the time of tender, a Contract may be awarded subject to a written undertaking to enhance his own and/or Sub-Contractor's quality assurance system to the satisfaction of the Engineer before commencement of the contract.

C3.6.3.3 Quality Assurance Staff

The Contractor shall satisfy the Engineer that a quality specialist together with sufficient and suitably qualified staff will be assigned to control the quality of the material used by each sub-contractor engaged in the supply of critical and major components and sub-assemblies.

C3.6.3.4 Engineer's Quality Assurance Representative/Inspector

The Engineer may elect to appoint an independent quality assurance representative to act in a surveillance capacity on his behalf for part or all of the contract.

The Engineer's Quality Assurance Representative will be a selected Sub-Contractor and will be paid by the Contractor under this Contract for all tests passed by the Inspector and certified by the Engineer. The Inspector will not act as the quality controller for the Contractor or his Sub-Contractors and accordingly any tests failing inspection will be for the account of the Contractor. Similarly, the costs of all inspections arising following any failed tests will be for the account of the Contractor.

C3.6.3.5 Classification of Material

Part II of the above-mentioned Code of Practice, i.e. a quality system for manufacture and installation, will apply only to certain critical material, products and services if and where indicated hereunder in this document.

C3.6.3.6 Sub-Letting

All enquiries made and contracts placed by the Contractor for critical components shall require that sub-contractors comply with the requirements of the preceding sub-clauses. Responsibility for and all associated costs of compliance shall rest with the Contractor. In instances where SABS 0157 is not applicable, Tenderers must indicate what equivalent alternative Code of Practice is being implemented.

C3.6.3.7 Disqualification

Tenderers who do not include the formally documented statements called for in Sub-Clause C3.6.2.1 and who do not respond in terms of Sub-Clause C3.6.2.2 above may be disqualified.

C3.6.4 Standard Specifications

C3.6.4.1 Standardized Specifications

The following standard specifications shall apply:

A	1986	-	GENERAL
AB	1986	-	ENGINEER'S OFFICE
C	1982	-	SITE CLEARANCE
D	1988	-	EARTHWORKS
DA	1988	-	EARTHWORKS (Small Works)
DB	1989	-	EARTHWORKS (Pipe Trenches)
DK	1996	-	GABIONS and PITCHING
G	1982		CONCRETE (Structural)
L	1983	-	MEDIUM PRESSURE PIPELINES
LB	1983	-	BEDDING (Pipes)

(Note 1 - "SABS" has been changed to "SANS, without change to the contents of the specifications).

Preface on Interim Situation until Full Suite of SANS Series Specifications are Available

The Bill of Quantities is based on the SABS 1200 system of specifications and measurement.

Where SANS specifications are available, these have been incorporated into the "Contract" section of this document.

Where overlapping specifications from the SANS 2001 series of specifications occur the appropriate SABS 1200 specifications have been incorporated into the Project Specifications.

In such cases, the requirements of the SABS 1200 specifications shall prevail over the requirements of the SANS specification(s).

The payment clauses in the Bill of Quantities are based on the SABS 1200 series of specifications for consistency and the Tenderer is required to ensure that he has priced all of the requirements pertaining to the SABS specifications.

The variations and additions to the standardised specifications (Project Specifications) as well as the Particular Specifications are included as C3.7 and C3.8 respectively. The variations are prefixed PS, and take precedence over the SABS Standardised Specification.

Where the particular specifications are in conflict with either the variations and additions to standardized specifications or the SABS Standardised Specifications, the particular specifications shall take precedence.

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 10396: 2003:	Implementing Preferential Construction Procurement Policies using Targeted Procurement Procedures
SANS 1921-1 (2004):	Construction and Management Requirements for Works Contracts Part 1: General Engineering and Construction Works
SANS 1921-2 (2004):	Construction and Management Requirements for Works Contracts Part 2: Control of Traffic on Public Roads
SANS 1921-6 (2004):	Construction and Management Requirements for Works Contracts Part 6: HIV / AIDS Awareness

The standardised specifications (SABS 1200) must be read in conjunction with the new SANS 1921 family of standards. In case of any discrepancy or conflict between the two, the SABS 1200 specification shall take precedence and shall govern.

Refer also to the Preface on the first page of the Project Specification as an interim situation until the full suite of SANS Series of Specifications is available.

The term “Project Specifications” appearing in any of the SABS 1200 standardised specifications is deemed to be equivalent to the term “Scope of Work” in SANS Specifications.

C3.6.4.2 Certification by recognised bodies

Wherever possible items and materials for construction of the works shall comply with the relevant South African Bureau of Standards Specifications and with the British Standards where these are applicable in the absence of local standards.

The Contractor, when using materials conforming to a Standard Specification shall, if called upon, furnish the Engineer with certificates of tests showing that the materials do so conform.

C3.7: PROJECT SPECIFICATIONS

C3.7 PROJECT SPECIFICATIONS

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C3.7.1 PSA: GENERAL (Applicable to SABS 1200 A – 1986)

PSA 1 SCOPE

Replace the first paragraph of sub-clause 1.1 with the following: -

1.1 This specification covers requirements, principles and responsibilities of a general nature which are normally applicable to all civil engineering contracts as well as the requirements for the Contractor's establishment on Site.

PSA 2 INTERPRETATIONS

PSA 2.3 Definitions

(a) General

Add the following definitions: -

General Conditions: The General Conditions of Contract specified for use with this Contract and the Special Conditions of Contract as applicable.

Specified: As specified in the Standardized Specifications, the Drawings or the Project Specifications.".

(c) Measurement and Payment

Replace the definitions for fixed charge, time-related charge and value-related charge with the following: -

"**Fixed Charge**: A charge that is not subject to adjustment on account of variation in the value of the Contract Sum or a change in the Due Completion Date.

Time-related Charge: A charge, the amount of which is varied in accordance with any changes in the Due Completion Date of the work as adjusted in accordance with the provisions of the Contract. The payment of the time related charges will be limited to the percentage approved progress of construction.

Value-related Charge: is not applicable in this contract.

PSA 3 MATERIALS

PSA 3.1 Quality and Samples

Add to the Sub-Clause:

All manufactured materials supplied shall be new materials unless the contrary is specified. All materials specified in accordance with SABS Specifications shall bear the SABS mark, whether so specified or not.

No used or recycled material may be used in the Works unless expressly authorised by the Engineer.

Materials specified as being to the approval of a Standard Bureau shall bear the official mark of the appropriate standard.

The Contractor shall arrange for all necessary process control tests for soil properties, density, etc., and concrete cube tests and is responsible for the cost of all testing to ascertain that the materials do comply with the relevant minimum requirements and all such costs shall be deemed to be included in the tendered rates. The cost of acceptance control tests done by the Engineer, of which the results do not comply with the minimum requirements, shall be for the Contractor's account. The tests must be carried out by an independent laboratory approved by the Engineer.

The Contractor shall inform the Engineer of any process control testing to be done at least 48 hours before such test are required and must allow in his programme for the time necessary for the tests and the processing of the results thereof.

Add the following sub-clause: -

PSA 3.3: Ordering of Materials

The quantities set out in the Schedule of Quantities have been carefully determined from calculations based on data available at the time and should therefore be considered to be only approximate quantities. The liability shall rest entirely and solely with the Contractor to determine before ordering, the required types and quantities of the various materials required for completion of the Works in accordance with the Specifications and the Drawings issued to the Contractor for construction purposes.

Any reliance placed by the Contractor on the estimated quantities stated in the Schedule of Quantities issued for tendering purposes, or measurements made by the Contractor from the drawing issued for tendering purposes, shall be entirely at the Contractor's risk, and the Employer accepts no liability whatever in respect of materials ordered by the Contractor on the basis of Tender Documents.

PSA 4 PLANT

PSA 4.2 Contractor's Office, Stores & Services (Refer SANS 1921-1 Clause 4.14)

Add to the Sub-Clause:

The Contractor's construction camp shall be fenced off and shall contain all offices, stores, workshops, toilet facilities, etc. The camp shall always be kept in a neat and tidy condition.

No personnel will be allowed to reside on the Site. The Contractor shall be responsible for the security of his construction camp and of the construction Site, at his own cost. Only night-watchmen may be on the Site after hours.

The Employer will indicate possible areas for establishment of site camp and pipe yards. It shall be the Contractor's responsibility to negotiate terms of use with the landowners and land users at the applicable site(s) to enable him to erect his site offices, workshops and storage facilities. The Contractor shall ensure that, in addition to his own requirements, 500 square meters of space is provided within his secured area for skills training purposes. The temporary facilities and ablution facilities shall comply with the requirements of the Local Authority.

On completion of the Works or as soon as the Contractor's facilities are no longer required the Contractor shall remove such facilities and clear away all surface indications of their presence.

PSA 5 CONSTRUCTION

PSA 5.1 Survey

PSA 5.1.1 Setting out the Works

Add before the first sentence:

The Contractor will be required to set out the various sections of the Works in the order that he proposes to undertake the work as per his programme, at least one week prior to commencing work on these sections, to enable the Engineer to check the design proposals in the field and thereafter to make any minor changes which he may deem necessary. Any additional survey work or setting out required as a result of these changes shall be undertaken on a daywork basis.

PSA 5.1.2 Preservation and Replacement of Beacons and Pegs subject to the Land Survey Act (Refer SANS 1921 - 1 Clause 4.15)

Add to the Sub-Clause:

The Engineer will arrange for any pegs that are missing to be replaced at the Contractor's expense.

All survey reference marks shall be clearly marked and protected by the erection of three fencing standards.

All plot boundary pegs shall be painted and marked with fencing droppers.

PSA 5.4 Protection of Overhead and Underground Services (Refer SANS 1921-1 Clause 4.17)

Delete title and substitute the following:

Protection of Visible and Underground Services (Sub-Clause 5.4).

PSA 5.6 Pollution

Add to the Sub-Clause:

The Contractor shall take all reasonable measures to minimise any dust nuisance, noise, pollution of streams and inconvenience to or interference with the public or others arising out of the execution of the Works.

PSA 5.7 Safety (Refer SANS 1921-1 Clause 4.18)

Add to the Sub-Clause:

All work and particularly work carried out in the proximity of buildings, bridges, tanks or other structures shall be carried out in conformance with the regulations framed under the Occupational Health and Safety Act, 1993 and the Minerals Act, Act 50 of 1991, including shoring where necessary, to ensure the safety of structures that are at risk. This clause shall be read in conjunction with the particular specification for health and safety.

The Contractor shall enter into an agreement on Occupational Health and Safety as per the pro forma bound into this document.

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

PSA 5.9 Protection of Structures (new sub-clause)

Where work is carried out in the proximity of buildings, bridges, buried services, tanks, wall or other structures, the Contractor shall take all necessary precautions required in terms of the regulations framed under the Occupational Health and Safety Act, (Act Nº 85 of 1993) to ensure the safety of structures and services that are at risk.

PSA 6 TOLERANCES

PSA 6.2 Degrees of Accuracy

Add to the Sub-Clause:

Generally, Degree of Accuracy II shall be applicable to the whole of the Works, unless specified otherwise (refer specifically to PSD 6 and PSG 6).

PSA 8 MEASUREMENT AND PAYMENT

PSA 8.2 Payment

PSA 8.2.1 Fixed-Charge and Value-Related Items

Add to the Sub-Clause:

The amount, if any, by which the sum of the fixed-charge and value-related items exceeds three percent of the net total tendered amount (excluding allowances for contingencies and price escalation) shall be regarded for payment purposes as time-related items and will be paid in accordance with Clause 8.2.2. (Refer to Clause C2.1 (e) of the Pricing Instructions).

PSA 8.2.2 **Time-related Items** (refer to Clause C2.1 (e) of the Pricing Instructions)

Add to the Sub-Clause:

Notwithstanding the provisions of Sub-Clause 8.2.2, an approved extension of time will not qualify the Contractor to receive any payment for that portion of fixed charge and value-related items which has become regarded as "time-related" items in terms of PSA 8.2.1 above.

PSA 8.4.2.2 Temporary Works – Dealing with Water on Works

Add to the Sub-Clause:

The sum in PSA 8.4.2.2 (h) shall cover the cost of providing, operating and maintaining the necessary equipment and other temporary works for dealing with groundwater in trenches and excavations.

PSA 8.5 Sums stated provisionally by the Engineer

Add the following new subclauses to A 8.5:

PSA 8.5(c) Community Liaison Officer

In addition to the requirements of clause 8.4.3 of SANS 1200 A, the Contractor shall allow for a Community Liaison Officer for the duration of the Contract. A provisional sum is included in the Schedule of Quantities for the payment of a C.L.O. Provision is also made in the Schedule of Quantities for the Contractor to include a mark-up on the amounts paid. The rate for payment of the CLO will be R7000 per month.

PSA 8.5(d) Skills training

In addition to the requirements of Clause 8.4.3 of SANS 1200 A the Contractor shall allow for skills training by an accredited trainer to be approved by the Engineer of some of the local labourers who will be employed on site. A provisional sum is included in the Schedule of Quantities for the payment for skill training. Provision is also made in the Schedule of Quantities for the Contractor to include a mark-up on the amounts paid.

PSA 8.8.2 **Dealing with Traffic** (to be read in conjunction with SANS 1921 – Part 2)

Add the following to A 8.8.2:

This item shall include for the supply, erection and maintenance of all temporary road signs and delineators and for flagmen that may be required, in terms of the South African Road Traffic Signs Manual, for any and all road crossings and work within the road reserve for the full duration of the work within the road reserve. All road signs and delineators shall be new.

The tendered sum for the accommodation of traffic shall include full compensation for all items necessary for such accommodation and the construction and maintenance of bypasses including existing roads used as bypasses during the construction period. It shall also include full compensation for traffic control, the provision of traffic signs, (where necessary), communications equipment required to regulate traffic, for the construction of any necessary temporary drainage works, for the maintenance of all drainage works, arranging the moving of services and subsequent reinstatement thereof, attending to traffic problems and complying with the requirements of the Road Traffic Ordinance and the relevant local authorities.

Payments shall be made in equal monthly instalments from the date of commencement of such work to the end of the contract period.

C3.7.2 PSAB: ENGINEER'S OFFICE (Applicable to SABS 1200 AB - 1986)

PSAB 2 INTERPRETATIONS

PSAB 2.1(b) Supporting Specifications

Delete the Sub-Clause and substitute the following:

SABS 1200 A

PSAB 2.3 Definitions

Delete the first two lines and substitute the following:

For the purposes of this specification the definitions given in SABS 1200 A shall apply:

PSAB 3 MATERIALS

PSAB 3.1 Nameboards

In the 3rd line delete “South African Institution of Civil Engineers” and substitute with “Consulting Engineers South Africa”.

In the 4th line add “and the logo and name of the Municipal Infrastructure Grant” before the words “and the names and titles....”

PSAB 3.2 Office Building(s)

Delete the first sentence and substitute the following:

Where required, the Contractor shall supply and furnish one temporary office, of size at least 5m x 3m, for the sole use of the Engineer and his staff. The office is to be erected within the security area enclosing the Contractor’s camp and Contractor’s offices.

Add to the Sub-Clause:

In addition to the furnishings listed under sub-items (a) to (i), the following shall be provided and properly maintained:

(j) If power is to be used by the Contractor on site:

electrical installation is to include a light and one 15A plug point plus an adequately sized air conditioning unit (for heating and cooling) or, alternatively, one 2000 W electric heater and one 375 mm diameter electric fan.

or

(j) If power is unlikely to be available on site:

one gas operated light and one gas operated heater plus an adequate supply of gas.

(k) one refrigerator of at least 100 litre capacity

(l) one kettle of at least 2 litre capacity

(m) one tea set comprising six cups and saucers, six teaspoons, one teapot, one sugar bowl and one milk jug

(n) covered parking for two vehicles

(o) two “Barhold” or similar wall mounted racks each with 6 clamps suitable for hanging A0 sized drawings

(p) one large meeting table

(q) ten additional chairs

The Engineer’s office shall be cleaned daily.

In addition, the offices for the Engineer shall be supplied with approved burglar proofing, the cost of which shall be taken as included in the relevant tendered rates.

Furthermore, the Contractor shall supply two shaded carports for the exclusive use of the Engineer. The carport shall be constructed with gum pole uprights with IBR or corrugated iron roofing with 80% shade cloth cladding to the sides. The surface bed of the carport shall be free draining and constructed with a 100 mm layer of 19 mm stone.

PSAB 4 PLANT

PSAB 4.1 Telephone

Add the following:

"The Contractor shall provide, for the sole use of the Engineer, the latest model of Samsung or Huawei" cellular telephone complete with an approved airtime contract with data, sim card etc. The tendered Fixed and Time Related Preliminary and General Charges in the Schedule of Quantities shall be deemed to include for all costs in this regard and shall include for an amount of R 200.00 per week to cover the cost of calls and data.

PSAB 4.2 Survey Equipment (New Sub-Clause)

The Contractor shall provide the following survey equipment on the Site from the commencement to the completion of the Works:

- One automatic level and tripod
- One levelling staff (4 m long, 1 cm gradations)
- One staff angle bubble
- One metal change-point for levelling
- One spirit level (one metre long)
- Two steel-tipped ranging rods each 2,5 m long
- One 25 m stilon tape
- One 5 m steel tape
- One hammer (2 kg)
- Steel pegs in sufficient quantities as required

The above equipment may be shared by arrangement between the Contractor and the Engineer or his representative on Site. The Contractor shall maintain the equipment in good working order and keep it clean until the completion of the Works. The Contractor shall keep the equipment continuously insured against any loss, damage, or breakage and he shall indemnify the Engineer and the Employer against any claims in this regard. Upon completion of the Works the survey equipment as listed above shall revert to the Contractor.

The Contractor shall maintain the equipment in good working order and keep it clean until the completion of the Works.

The tendered Fixed and Time Related Preliminary and General Charges in the Schedule of Quantities shall be deemed to include for all costs in this regard.

PSAB 4.3 Computer Equipment

The Contractor shall provide, for the sole use of the Engineer for the duration of the contract, a laptop computer and appurtenant hardware with minimum specification as follows:

- I7 8705G 3.1GHz- 4.1GHz
- 16GB Ram
- 512GB SSD
- NVidia 2GB graphic card
- 15.6 inch laptop
- Windows 10 Pro 64 bit

- Wireless mouse and keyboard
- A3/A4 multi-functional laser printer/fax/scan/copier (Colour)
- 500GB External portable HDD 2.5 inch (Western digital or Seagate)
- 12 megapixel digital camera
- Laptop carry bag
- Security cable

The following software shall be pre-loaded onto the computer:

- Office 365 Business (includes Excel, Word, Outlook, PowerPoint)
- Microsoft Project 365
- AutoCAD LT 2018 SLM
- Nuance PDF
- Eset Nod32 antivirus
- Civilsoft Bill
- Drop Box

The Contractor shall keep this equipment continuously and comprehensively insured and shall indemnify the Employer and the Engineer against any claims in this regard. The Contractor shall maintain this equipment in good working order and maintain all annual subscriptions on pre-loaded software until the completion of the Works, whereupon ownership of said hardware and software shall revert to the Contractor.

The Contractor shall ensure that adequate supplies of consumables (paper and ink cartridges) to a maximum amount of R 2 000.00/month are always available on site. If the usage by the Engineer and his staff exceeds R 2 000.00/month, any additional costs will be reimbursed under the item for Dayworks Materials.

The tendered Fixed and Time Related Preliminary and General Charges in the Schedule of Quantities shall be deemed to include for all costs in this regard, except for expenses in excess of the R 2 000.00/month for consumables, which will be reimbursed as set out above.

PSAB 4.4 Vehicles for the Engineer's Representative

The Contractor shall provide for the exclusive use of the Engineer's Representative and his staff one or more vehicles as required by the Engineer. The vehicle/s shall, unless specified otherwise, be a minimum ½ ton two-wheel drive LDV (Bakkie) and shall, if not new, be in good condition to the approval of the Engineer. The tendered rates shall include for all insurances, financing costs, depreciation, licensing, fuel, lubricants, maintenance and repairs and any other expenses and fees of a general nature that may occur. The Contractor will provide a fuel card with each vehicle supplied which can be used for fuel and other consumables purchases by the driver of the vehicle.

The Contractor shall keep this equipment continuously and comprehensively insured and shall indemnify the Employer and the Engineer against any claims in this regard. The Contractor shall maintain the vehicle/s in good working order until the completion of the Works, whereupon ownership of said vehicle/s shall revert to the Contractor.

Separate items are included in the Bill of Quantities to cover this item as follows:

a) A monthly fixed rate to cover the cost of providing the vehicle and ensuring that it is always fully serviceable and roadworthy.

b) A cost to cover travel by the Engineer's staff. This item will be measured in kilometres (km) and will be measured monthly according to the odometer reading/s and shall cover all fuel, maintenance, repairs and consumables."

PSAB 5 CONSTRUCTION

PSAB 5.2 Engineer's Office (Refer SANS 1921-1 Clause 4.14)

Add to the Sub-Clause:

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

PSAB 5.5 Survey Assistants

Delete the first sentence and substitute the following

The Contractor shall make available to the Engineer two suitably trained labourers for use on and about the site on survey and other work directed by the Engineer at all reasonable times.

PSAB 8 MEASUREMENT AND PAYMENT

PSAB 8.1 Scheduled Items

Delete the first sentence and substitute the following:

Items will be scheduled in terms of Sub-Clauses 8.3.2 & 8.4.2 of SABS1200 A.

PSAB 8.2.2 (a) Laboratory Testing

It is not an express condition of this contract that the Contractor need erect a laboratory.

A provisional sum is included in the Bill of Quantities for the payment of the acceptance control testing (by a commercial laboratory) solely for use by the Engineer.

Provision is also made in the Bill of Quantities for the Contractor to include a mark-up on the amounts paid.

C3.7.3 PSC: SITE CLEARANCE (Applicable to SABS 1200 C – 1980 As Amended 1982)

Note: Particular Specification PI: Employer's Environmental Management Specification for Environmental Management of construction projects, and Particular Specification

PSC 3 MATERIALS

PSC 3.1 Disposal of Material

Add to the Sub-clause:

Material obtained from clearing must be disposed of off-site by the Contractor at his expense. Disposal of combustible material by burning will not be permitted. The Contractor will be held responsible for observing the by-laws and regulations of the relevant local authority and for any injury to persons and damage to property caused by any fire starting on site, in his camp, or a fire started for any reason by his employees, regardless of whether such injury or damage is the direct or indirect result of such fire.

PSC 5 CONSTRUCTION

PSC 5.2.3.2 Individual Trees

Delete the second sentence of the Sub-Clause and substitute the following:

The amount of the penalty payable by the Contractor for the removal or damage by him of a tree designated for preservation shall be as stated in the Employer's Environmental Management Specification and/or Environmental Management Plan (EMP).

PSC 5.3 Clearing

Add the following new Sub-Clauses:

PSC 5.3.1 Fences (New Sub-Clause)

Where the pipeline route crosses an existing fence, a section of fencing not exceeding 10,0m in length may be removed temporarily during construction and thereafter reinstated to a condition not worse than the original as soon as the pipeline has been installed and backfilled in the immediate vicinity of the crossing. For the period while the existing fence is dismantled, the Contractor shall erect, at the end of each day's operations, a temporary fence to close the gap in the existing fence.

PSC 5.3.2 Demarcation & Fencing of Pipeline Servitudes (New Sub-Clause)

Demarcation of the pipeline construction servitude will be by means of wooden stakes. These stakes will be at least 1m high, painted white and placed at least every 30m on either side of the linear feature, in all areas where works are occurring. The stakes shall be moved as required as the project progresses.

PSC 5.3.3 Fencing of Pipeline Servitudes in Populated Areas (New Sub-Clause)

In populated areas and where directed by the Engineer the Contractor shall also supply, install and maintain temporary fencing on both sides of the working area (servitude) and around the perimeter of all agreed additional working areas during construction for prevention of unauthorised access and shall remove on completion of the works. The fencing shall comprise 2m high Bonnox 4 x 4 Mesh fencing, Bonnox pattern 1972/4, with straining posts and straining wires as required and according to supplier's directions and with mesh spacing not exceeding 100mm in both the vertical and horizontal directions. Chevron tape shall be interwoven in a zig zag pattern from the top to the bottom of the fence thereby clearly marking off the working area.

Gates shall be provided by the Contractor at all points as required for construction access purposes. The Contractor shall be held responsible for the control of access at these gates

at all times as well as to the worksite during removal and re-erection of fencing. No other opening in the fence shall be permitted and the Contractor shall be responsible for monitoring the fencing on a daily basis and repairing any such opening within the same day that it is detected. Notices in two official languages (English and isiZulu) shall be attached to the fence where appropriate to indicate that the site is for personnel employed on the Contract only and that unauthorised entry is forbidden.

PSC 5.4 Grubbing

In the fourth line delete “200mm” and substitute 300mm.

PSC 5.6 Conservation of Topsoil

Add to the Sub-Clause:

All topsoil shall be conserved for later use by stockpiling, clear of the working area.

PSC 5.8 Demolition of Structures

Add the following new Sub-Clauses:

PSC 5.8.1 Removal and Re-Erection of Structures

Where the Contractor is directed to dismantle structures to facilitate construction and thereafter to re-erect the same structures or erect new structure, the structure shall be erected at the same location, or such other location as may be required by the owner within the same property, using the same or similar materials as those set aside when removing the structure. The acceptance of the work by the Engineer and certification for payment shall be subject to the Contractor submitting to the Engineer documentary evidence of the owner’s satisfaction that the re-erected structure, the over-riding consideration being that it shall be in a condition no worse than that pertaining prior to its removal.

The tendered rates shall include for the provision of a detailed photographic and written record of the structures before dismantling commences and following re-erection.

New structures will be erected in cases where existing structures could not be removed without damaging it. This must be approved by the Engineer before any structure is demolished.

PSC 5.8.2 Demolition of Building Structures

Where the Contractor is directed to demolish structures, the Contractor shall provide a Method Statement for the approval of the Engineer. Entering upon the premises for the purpose of the demolition shall not commence before the Contractor has received a release form, duly authorised by representatives of the Employer and the Engineer, in which any special conditions applicable to the demolition are documented.

PSC 8 MEASUREMENT AND PAYMENT

PSC 8.2 Scheduled Items

PSC 8.2.9 Transport Materials and debris to unspecified sites and dump

Delete the sub-clause and substitute:

The cost of cartage to the unspecified disposal site(s) shall not be paid separately and shall be deemed to be included in the Contractor’s rates for site clearance.

PSC 8.2.10 Remove Topsoil to a Nominal Depth of 150 mm and Stockpile

Delete from the sub-clause heading the words: 'to a Nominal Depth of 150 mm'
Add to the Sub-Clause:

The topsoil, where approved by the Engineer, shall be conserved for later use by stockpiling clear of the working area.

PSC 8.2.11 Fences (New Sub-Clause)

Separate payment will be made for dealing with fences in the manner specified in PSC 5.3.1 above as scheduled.

PSC 8.2.12 Demarcation Staking (New Sub-Clause)

Payment will be made per linear metre in the manner specified in PSC 5.3.2 above and removal on completion of the works.

PSC 8.2.13 Fencing of Pipeline Servitudes in Populated Areas (New Sub-Clause)

Payment will be made per linear metre of temporary fencing installed in the manner specified in PSC 5.3.3 above, and the rate shall include for maintaining such fencing in good condition, including daily surveillance and repair, throughout the duration of construction and removal on completion of the works.

PSC 8.2.14 Removal and Re-Erection of Structures (New Sub-Clause)

A Provisional Sum has been included for the removal and re-erection of structures within pipeline route servitudes.

Separate payment will be made for removing and re-erecting structures in the manner specified in PSC 5.8.1 above as scheduled and including for the costs of photographic and written records.

C3.7.4 PSD: EARTHWORKS (Applicable to SABS 1200 D - 1988)

PSD 3 MATERIALS

PSD 3.2.1 Material suitable for Embankments and Terraces

Embankment material shall be compacted to 90% modified AASHTO density.

PSD 4 PLANT

Add the following new Sub-Clauses:

PSD 4.5 Restriction on use of Plant (New Sub-Clause)

Where the Contractor finds it impractical to use mechanical plant for excavation or to complete portions of the work due to restrictions caused by difficult access or the presence of existing structures, pipelines or services shown on tender drawings, the Contractor will be deemed to have satisfied himself as to the alternative requirements when entering rates against the appropriate items in the Bill of Quantities as no claim for extra payment based on the inability to use plant in such circumstances will be considered.

PSD 4.6 Vibration loadings from use of Plant (New Sub-Clause)

The onus will be on the Contractor, when proposing to use heavy plant or equipment to complete work in close proximity to existing structures, pipelines or services, to determine the effect of the vibration loading from the plant or equipment on the supporting ground or foundation and the structure, pipeline or service and take all necessary steps to ensure that the stability or integrity of the element concerned is not compromised by the particular selection and use of plant or equipment.

Any damages caused to existing elements directly or indirectly arising out of the use of plant and equipment in close proximity to such existing elements shall be made good, to the satisfaction of the Engineer by the Contractor at his own expense.

PSD 5 CONSTRUCTION

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

Delete the Sub-Clause and substitute:

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

Trench excavations shall be adequately protected by means of fences or barricades so as to enclose the excavations, as approved by the Engineer. Fences shall have at least two horizontal double sided 'red/white' chevron tapes threaded through the fences as approved by the Engineer. The tapes shall be stretched tightly between supports along both sides and ends of the excavation at levels approximately 0,45 m and 1,25 m above the ground. The supports shall consist of poles or iron standards securely planted in solid ground at not more than 10 m centres so as to enclose the excavations.

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

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

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

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

Notwithstanding Sub Clause 5.1.1.3 the Engineer shall be notified at least 48 hours beforehand of the Contractor’s intention to use explosives on site.

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

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

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

a) The Engineer or Inspector of Explosives shall have the power to prohibit the use of explosives in cases where in his opinion, the risk of injury or damage to persons, property or adjoining structures is too high. Such action by the Engineer shall not entitle the Contractor to any additional payment for having to resort to other less economical methods of construction unless otherwise provided in the Contract Data or Bill of Quantities.

b) Should blasting be necessary, the Contractor shall take every precaution to protect the Works and persons, animals and property in the vicinity of the site. The Contractor will be held responsible for any injury or damage caused by any blasting operations and shall make good such damage at his own expense.

c) The requirements for the Explosives Regulations Act (Act 26 of 1956) and the requirements of the Inspector of Explosives shall be complied with. In addition, where applicable, the requirements of Chapter 9 of the Regulations published in terms of the Mines and Works Act (Act 27 of 1956) and the requirements of the Government Mining Engineer shall be complied with.

d) A copy of each blasting permit issued to workmen, and of each permit issued to the Contractor to cover the purchase, storage and transport of explosives, shall be handed to the Engineer. The Contractor shall grant the Engineer access to all records maintained for the Inspector of Explosives or the Government Mining Engineer, as the case may be.

e) Before any blasting is undertaken, the Contractor, together with the Engineer shall examine and measure up any buildings, houses or structures in the vicinity of the proposed blasting and establish and record together with the owners thereof the extent of cracking or damage that may exist before commencement of blasting operations. The Contractor shall produce a photographic record of neighbouring structures before blasting commences. These structures will be pointed out by the Engineer. It shall be the responsibility of the Contractor to make good at his own expense any further damage to such houses, buildings or structures which is a result of the blasting.

f) Where there is reasonable danger of damage to power and telephone lines or any other property, the Contractor shall suitably adapt his methods of blasting, the size of the charges and use adequate protective measures such as cover blasting in order to limit the risk of damage as far as possible.

g) When blasting to specified profiles, the Contractor shall so arrange the holes and charges that the resulting exposed surfaces are as sound as the nature of the material permits. The Contractor shall make good at his own expense any additional excavation necessitated by the shattering of rock in excess of any overbreak allowance specified in

the Specification Data or in any other specification or given on a drawing.

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

a) Approval of methods and keeping of records

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

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

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

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

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

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

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

b) *Vibrations*

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

Table 2 - Maximum Particle Velocities (Vibration)

Maximum peak particle velocity (mm/s)	Effect on people and buildings
0,5	Threshold of human perception unlikely to cause damage of any type
5	Limit for blasting adjacent to historical monuments

25	Limit for blasting near private dwellings in order to reduce disturbance to residents to a minimum
50	Limit for blasting adjacent to residential structures on good foundations
84	Limit for property owned by concern doing the blasting (ie. minor plaster cracks acceptable)
120	Recommended maximum level for blasting adjacent to sturdy reinforced concrete structures

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

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

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

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

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

Table 3 - Maximum Charge Levels

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

Only *detonating relays of at least 20 milliseconds delay interval shall be used.*
The above relationship can be used to calculate charge mass for other velocity limits. However, if higher charge levels have to be used for practical reasons, expert advice and possibly vibration measurements will be required.

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

PSD 5.1.1.3d) Negligence (New Sub-Clause)

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

PSD 5.1.2.2 Detection, Location and Exposure (Refer SANS 1921-1 Clause 4.17)

Add to the Sub-Clause:

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

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

PSD 5.1.4.3 Excavated Material Not to Endanger or Interfere (Refer SANS 1921-1 Clause 4.10)

Delete the sentence: "If the necessity ……. will be borne by the Employer."

PSD 5.1.6 Road Traffic Control

Delete from the fifth, sixth and seventh lines all words following "stated in the project specification".

An item has been included in the Bills of Quantities to cover the relevant costs.

PSD 5.1.7 Excessive Pollution (New Sub-Clause) (Refer SANS 1921-1 Clause 4.19)

The Contractor shall take all reasonable measures to minimize excessive noise and dust nuisance, pollution of streams and inconvenience to or interference with the public or others because of the execution of the works.

PSD 5.2.2.1 Excavation for General Earthworks and for Structures (Refer SANS 1921-1 Clause 4.10)

Add to the Sub-Clause:

(f) Where outside shuttering is ordered by the Engineer, the excavations shall be carried out for an extra width of not more than 600mm all around the structure, measured from the base of the face to be shuttered, to allow for the shuttering to be fixed, this extra excavation and refilling where necessary is to be measured and paid for under quantities allowed for this purpose in the Schedule. Outside shuttering shall be used for the construction of all major structures unless ordered otherwise by the Engineer.

(g) Where permanent concrete is to be placed against an excavated face, the excavation shall be trimmed to ensure that there is no projection greater than 20mm protruding into the excavation profile.

PSD 5.2.2.2 Borrow Pits

..... Add the following:

..... "A commercial source shall, for the purposes of this Specification, mean a source of material provided by the Contractor, not the Employer.

..... Where it is specified that material shall be obtained from commercial sources, the Contractor shall be responsible and include in his price for fill from commercial sources,

for finding a source of suitable material, for making all arrangements for procuring the material with the owner of the source, for the payment of any royalties, charges or damages and for transporting the material to the site regardless of the distance involved.

..... No payment will be made for the removal of overburden or stockpiling at the commercial source and no extra over payment for excavating in intermediate, hard or boulder material shall apply.

Commercial sources shall not be used for any materials without the written approval of the Engineer."

PSD 5.2.2.3 Disposal

Delete the second sentence and substitute:

"The Contractor shall make his own arrangements for the disposal of excess or unsuitable materials. The disposal / spoil site shall meet with the approval of the Local Authority within whose area it falls, and the spoiling shall comply with the statutory and municipal regulations. The cost of all loading, hauling, dumping, spreading, compacting and any other costs or charges will be deemed to be included in the rates tendered for spoiling of material."

PSD 5.2.3.1 Embankments

In the fourteenth line delete “600mm” and substitute “300mm”

In the seventeenth line delete “300mm” and substitute “150mm”

On the twentieth line delete the sentence starting ‘Each layer shall be .... ‘and substitute the following:

Each layer shall be compacted to achieve 90% modified AASHTO density except where indicated otherwise on the Drawings.

PSD 5.2.4.2 Topsoiling

Delete the Sub-Clause and substitute:

Where scheduled, topsoil shall be placed on all surfaces and on embankments and shall be lightly compacted by wheeled vehicles or by tamping, and trimmed neatly to the required lines grades and levels. The final thickness of topsoil after compaction shall be at least 75mm. Prior to topsoiling, the surfaces to be topsoiled shall be prepared by pulling horizontal ruts into the soil with the tines of a front-end loader or other suitable method to retard erosion of the topsoil.

PSD 5.2.4.3 Grass or other vegetation

Add to the Sub-Clause:

The surface of topsoiled embankments, terraces and other areas designated by the Engineer areas are to be planted with fine sturdy approved grass as specified elsewhere. The grassed areas are to be fertilized and watered until the area is fully covered with grass.

PSD 5.2.5.1 Freehaul

Delete the Sub-Clause and substitute:

All haul will be regarded as freehaul. No overhaul will be paid under this contract.

PSD 5.2.5.2 Overhaul

Delete the Sub-Clause.

PSD 6 TOLERANCES

PSD 6.3 Excavation by Mechanical Means (New Sub-Clause)

Where bulk excavation is carried out by earthmoving equipment, such excavation will only be allowed to within a level of 300 mm, or less as ordered by the Engineer, above the general level to which the ground has to be reduced, the balance of the bulk excavation being carried out by hand or by other means approved by the Engineer.

PSD 7 TESTING

PSD 7.4 Tests to the Contractors Account (New Sub-Clause)

The Contractor shall make arrangements with a soil testing laboratory to undertake the following tests and to pass the test results to the Engineer. The costs of such tests shall be included in the rates tendered for the appropriate item in the Bills of Quantities.

a) Material imported from outside the Contract Site as working surfaces, subgrade improvement or for fill material

One CBR and indicator test per 200m³ of compacted material brought on site, (river sand will normally be exempted from this requirement). A sample and one CBR and indicator test of the material proposed for importation shall be submitted to the Engineer for approval prior to the commencement of importation.

b) Fill material in place

One density and moisture content per 100m³ of compacted fill

c) Compacted subgrade or finished level

One density and moisture content per 200m² of compacted surface area.

Should any of the above density tests fail to comply with the specified requirements, the Contractor shall at his own expense remedy the failure and submit a new test to the Engineer.

PSD 7.5 Determination of Compaction (New Sub-Clause)

Determination of the standard of compaction achieved shall be carried out in accordance with Standard methods of testing road construction materials published by the Department of Transport Division of National Roads, Publication TMH.1.

PSD 7.6 Tests at the Employer's Request (New Sub-Clause)

Where CBR, indicator tests and the like are required on materials from within the Contract Site the Contractor shall also make arrangements with a soil testing laboratory to undertake these tests, the costs of which have been allowed for in the Bills of Quantities as a provisional sum. Payment for such tests will be per sample tested and reported to the Engineer.

PSD 8 MEASUREMENT AND PAYMENT

PSD 8.1.1 Basic Principles

Delete the first sentence and substitute:

"The basic principles of measurement and payment for all earthworks are that the rates tendered for excavation shall cover the cost of excavating and re-use of the excavated

material in backfilling, forming embankments, etc., including any necessary additional offloading, stock-piling and reloading and the cost of disposal of any".

In the eighth line delete "Drawing D-2" and substitute "Fig D-2"

PSD 8.1.2 Basic Principles

Delete the first line of the first sentence and substitute:

"Excavations which are required to be backfilled, or partially backfilled, will be measured as if taken out"

Delete the fifth and sixth lines and substitute:

"other such structures, the volume will be measured from the finished outline of the concrete, or the blinding to the concrete (as the case may be), as shown on the Drawings.

PSD 8.3 Scheduled Items

PSD 8.3.2 Bulk Excavation

Delete the second sentence and substitute:

"The rate shall cover the cost of complying with all precautions required in terms of 5.1 in addition to the cost of excavation, offloading to stockpile, stockpiling and reloading as may be necessary, spreading or backfilling, compacting and watering"

"Drawing D-1" in the fifth line and in the last line to read "Fig D-1"

PSD 8.3.3 Restricted Excavation

"Drawing D-2" in the first line to read "Fig D-2"

PSD 8.3.4 Importing of Materials

Delete sub-clauses (b) and (c).

Add the following sub-clauses

PSD 8.3.4 (d) For Embankment Construction

The rate shall cover the cost of royalties (if any) and acquiring suitable material, loading, transporting with freehaul distance, unloading, spreading in layers not exceeding 150mm thick, watering, compacting to 90% Mod AASHTO density, trimming slopes of embankment to required outline all in accordance with the Specifications. The rate shall also include for carrying out density testing and the disposal of any surplus material……..…Unit: m^3

PSD 8.3.4 (e) For Backfilling Around Structures

The rate shall cover the cost of royalties (if any) and acquiring suitable material, loading, transporting with freehaul distance, unloading, spreading in layers not exceeding 150mm thick, watering, compacting to 90% Mod AASHTO density, trimming upper surfaces to the required outline all in accordance with the Specifications……..Unit: m^3

PSD 8.3.4 (f) Rip and re-compact 300mm depth of Subgrade

The rate shall cover the cost to rip, treat and re-compact the subgrade layer within the box cut to eight passes with a 12-tonne heavy roller……..……Unit m^2

PSD 8.3.14 Overbreak (New Sub-Clause)

Where hard rock is encountered in bulk or restricted excavations, the Contractor shall be reimbursed for excavation and refilling with concrete Grade 10/40 under the base and for the

relevant grade of concrete for the structure walls for an excess of 200mm thickness beyond the scheduled excavation line. If a blinding layer is indicated then the 200mm shall be taken from the uppermost surface of the blinding layer.

No additional items have been provided for reimbursement of any additional excavation, concrete infill and/or formwork over and above the allowance stated. The Contractor is required to make his own estimate of any additional costs he feels may be required and these are to be included in the above-mentioned items. The method of measurement shall be on the basis of the area of rock encountered within the nett outline of the structure only and regardless of actual excavated levels…… Unit m^2

PSD 8.3.15 Backfill with Soilcrete (1:10 cement/sand mix)

The rate tendered shall include the supply of labour and all materials i.e. sand, cement, mixing the concrete, backfilling below and around structures and compaction to 98% modified AASHTO, including de-watering required to carry out the work..……....Unit m^3

C3.7.5 PSDB: EARTHWORKS (PIPE TRENCHES)
(Applicable to SABS 1200 DB - 1989)

PSDB 2 INTERPRETATIONS

PSDB 2.1 Supporting Specifications

Add New Sub-Clause:

PSDB 2.1.3 Specification for Labour Intensive Methods

SANS 1921 Part 5 shall also apply in the case of labour-based excavation.

PSDB 3 MATERIALS

PSDB 3.1 Classes of Excavation

Add to the Sub-Clause:

The classification of materials in respect of areas designated for hand excavation shall be as per Annex B of SANS 1921 Part B (Tables B.1 & B.2).

PSDB 3.3 Selected Granular Material

Delete the Sub-Clause and substitute:

Selected granular material shall be material of a granular, non-cohesive nature that is singularly graded between 0,6 mm and 10 mm, is free-draining and has a compactibility factor (as determined by the test given in Section LB of Part 3 of SABS 0120) not exceeding 0,4.

PSDB 3.4 Selected Fill Material

Delete the Sub-Clause and substitute:

Selected fill material shall be a sandy clay material having a PI not exceeding 6 and that is free from vegetation and from uncrushable lumps and stones of diameter exceeding 20mm.

PSDB 3.5(a) Backfill Material

In the third line delete "150mm" and substitute "100mm".

PSDB 3.5(b) Backfill Material

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

PSDB 3.5(c) Cement Stabilised Backfill (New Sub-Clause)

Where scheduled, or directed by the Engineer, backfill shall be stabilised with 5% cement by mass. The backfill material shall have a plasticity index not exceeding 10 and all material must pass through a sieve of aperture size not exceeding that specified in SABS 1200 LB, Sub-Clause 3.2, as amended.

The dry materials shall first be mixed in a concrete mixer, where after sufficient water is to be added to produce the stiffest consistency available for placing and compacting with vibrators.

PSDB 3.6 Materials for Reinstatement of Roads and Paved Areas

Delete the Sub-Clause and substitute:

Material used in the reinstatement of roadways shall fall into the following relevant categories:

(a) Foundation material recovered from the excavation of trenches across existing roadways which, if so instructed by the Engineer, shall be set aside and re-used as sub-base material.

(b) New material which shall conform to the requirements of:
(i) Clause 3.2.1 of SABS 1200 ME for the Subbase
(ii) Clauses 3.2 and 3.3 of SABS 1200 MF for the Basecourse
(iii) Clause 3.2.2 of SABS 1200 ME for the Gravel Wearing Course
(iv) Clause 3 of SABS 1200 MH for the asphalt surfacing

PSDB 3.7 Selection

Delete the second sentence and substitute the following:

The Contractor is not required to use selective methods of excavating but shall, if so instructed by the Engineer, screen or otherwise treat excavated material in order to produce material suitable for the bedding cradle or the bedding blanket.

PSDB 4 PLANT

PSDB 4.1 Excavation Equipment

In the first line delete “The Contractor” and substitute: “In sections deemed to be excavated by mechanical means, the Contractor”

Add to the Sub-Clause:

Should any portion of a pipe trench exceed the specified depth, the Contractor will be held responsible for any additional costs which may arise as a result of such over-excavation. Concrete filling or imported compacted fill may be ordered by the Engineer to be placed below the bottom of the trench.

PSDB 4.3 Compaction Equipment

Add to the Sub-Clause:

In sections designated to be compacted by labour-based methods hand stampers shall be used as per requirements of Clause 4.3 of SANS 1921 Part 5.

PSDB 5 CONSTRUCTION

PSDB 5.1.1 General

Add to the Sub-Clause:

The use of Labour-Intensive Methods is an integral component of this contract. The method of excavation of trenches is subject to determination according to the method described in PSDB 5.4.1.

PSDB 5.1.2.3 Sloping Ground

Delete the Sub-Clause and substitute:

The Contractor shall be responsible throughout the duration of the Contract, inclusive of the Defects Liability Period, for the provision of all soil erosion preventative measures necessary to protect the trenches, pipes and land utilised by the Contractor during the Contract from any adverse effects of soil erosion, settlement, scour, etc., resulting from the construction of the Works.
Cross embankments, generally extending across the full width of the working strip, consisting of low earth mounds shaped to rounded form and so oriented as to have a fall of 1% along their length, shall be constructed with compacted material having a minimum density of 90% modified AASHTO density and minimum dimensions and maximum spacings dependent on the slope of the ground along the length of the pipeline, as

indicated in the following table:

Slope of Ground	Minimum Height	Minimum Base Width	Maximum Spacing
0% - 2%	No cross-embankments required		
2% - 5%	300 mm	1,2 m	55 m
5% - 10%	300 mm	1,2 m	40 m
10% - 15%	375 mm	1,5 m	30 m
Greater than 15%	450 mm	1,7 m	20 m

The height of the cross-embankments for a distance of 1 metre on either side of the trench centreline shall be raised 150mm above the remainder of the cross-embankment to allow for settlement. In order to form a satisfactory drainage channel upstream of each cross-embankment (at a slope of 1%) the crown over the backfilled trench shall be removed for a distance of 0,5m upstream of the cross-embankment.

Cross-embankments shall be constructed to the same minimum standards and dimensions indicated above wherever artificial slopes have been formed on the working strip or other areas used during construction and, with the approval of the Engineer, are permitted to be so left.

Payment will be made for the construction of cross-embankments in accordance with Sub-Clause 8.3.4(c), provided construction thereof has been either ordered or approved by the Engineer prior to the commencement of such construction.

PSDB 5.1.2.4 Cross-Walls in Trenches (New Sub-Clause)

Where ordered by the Engineer, the Contractor shall place sacks of earth as sack breakers or cross walls around and above the pipe up to ground level, prior to backfilling, as a soil erosion measure. Such sacks shall be filled with selected material free of stones in excess of 50mm maximum dimension. One sack breaker shall consist of these sacks packed tightly against the trench bottom, pipe and actual trench sides, and against each other to form a solid cross wall at least 0,5m thick from the bottom of the trench to the surface.

An item has been included in the Bills of Quantities to cover the cost of the supply, installation and maintenance of sack breakers.

PSDB 5.2 Minimum Base Widths

Add to the Sub-Clause:

Trench sides shall be as near vertical as possible in order to minimise the quantity of backfill material required and to avoid possible difficulties where pipelines have to be installed parallel to existing services, fences, hedges, etc and to minimise the loading on the pipe.

The base width for trenches for cables, ducts and unbedded flexible continuous piping, of external diameter less than 125mm laid at a depth not exceeding 1,5m, shall be equal to the external diameter of the cable, duct or pipe, plus a side allowance of 200mm on either side.

PSDB 5.4 Excavation

Add to the Sub-Clause:

Where a pipe is to be laid in a vertically-sided trench with temporary side support, it is necessary to ensure that the compacted bedding and backfill is hard up against the soil forming the trench side by withdrawing the temporary supports stage by stage as the backfill rises up the trench.

PSDB 5.4.1 Determination of Method of Excavation (New Sub-Clause):
Trenches for pipelines shall be excavated by either mechanical means or by hand,

determined as follows:

Trial holes of minimum dimensions 1,0 x 1,0 m shall be excavated by hand along all pipeline routes at 50 m intervals ahead of the Contractor's programme for trench excavation. The trial holes shall be 1 m deep or less if intermediate or hard rock material is encountered.

If intermediate or hard rock material is encountered in the top 1 m of excavation at such trial holes, then excavation may be deemed to be carried out by mechanical means, the length of such excavation determined on the basis of other trial hole findings.

If soft material only is encountered at such trial holes, then excavation may be deemed to be carried out by hand up to a maximum depth of 1,5m, the length of such excavation determined on the basis of other trial hole findings. The consistency of the material shall be determined as per Table 1 of SANS 1921-Part 5 and the Classification of excavated material shall be as per Annex B of SANS 1921-Part 5 (Tables B.1 & B.2).

If intermediate or hard rock material is encountered in those stretches set aside for hand excavation on the basis of the trial hole findings, then the Contractor may be allowed to remove the intermediate or hard rock material by mechanical or whatever means, the rate for which is to include for backfilling and re-excavating (if necessary).

PSDB 5.5 Trench Bottom

Add to the Sub-Clause:

Where steel pipes are laid in waterlogged conditions and/or where so instructed by the Engineer a 150mm thick layer (See PSLB 5.2.5) of imported single sized stone (19mm size unless otherwise instructed by the Engineer) with a geofabric filter surround (“bidim” Grade A4 or similar approved) shall be constructed under the bedding layer specified for the pipes.

PSDB 5.5.1 Jointing Holes (New Sub-Clause)

Jointing holes shall be cut of sufficient length and depth to allow for the proper making or bolting of pipe joints and to ensure that joint collars or sleeves do not rest on the trench bottoms. After the pipework has been inspected, tested and approved by the Engineer, the jointing holes shall be refilled with selected soft material free from stone and then rammed to provide a continuous uniform support for the pipework. No specific payment will be made for forming and refilling holes, the cost of which is deemed to be included in the tendered rates.

PSDB 5.6.1 Backfilling - General

Add to the Sub-Clause:

Notwithstanding the requirements of Sub-Clauses 5.6.1 and 5.6.6, no pipe joint or pipe fitting shall be covered by either blanket or backfill material prior to the successful completion of the visual inspection and pressure testing of the relevant section of the pipeline.

All backfilling shall be carried out by hand and the Contractor must price his tender accordingly. No mechanical plant shall be used in backfilling without prior written consent of the Engineer.

PSDB 5.6.2 Material for Backfilling

Delete fourth, fifth and sixth lines and substitute the following:

Hard rock material shall not be used for, or incorporated into, the backfill above the bedding layers without the Engineer's approval.

PSDB 5.6.3 Disposal of Soft Excavation Material

Add to the Sub-Clause:

Surplus material or unsuitable material shall be disposed of off-site by the Contractor.

PSDB 5.6.4 Disposal of Machine Excavation, Hard Rock and Boulder Material

Delete the Sub-Clause and substitute:

Surplus machine excavation, hard rock and boulder material from trench excavations shall be disposed of off-site by the Contractor.

PSDB 5.6.8 Transport for Earthworks for Trenches

Delete the Sub-Clause and substitute:

The requirements of Sub-Clause 5.2.5 of SABS 1200 D as amended and as applicable shall apply.

(Refer also PSD 5.2.5.1 & 5.2.5.2)

PSDB 5.7.2 Areas subject to Traffic Loads

Add to the Sub-Clause:

for an extent of 2 m on either side of the carriage-way at each crossing.

PSDB 5.9.4 Bitumen Surfaced Roads: Sub-Base and Base

Add to the sub-clause:

Each Tenderer shall include in his tender allowances to cover the costs of reinstating all surfaces and inclusive of all layers to their conditions pertaining before the commencement of construction.

Items have been included in the Bill of Quantities to cover the reinstatement of certain surfaces (concrete and/or asphalted/gravel driveways and/or roads) and for payment purposes, the area of those specific surfaces shall be calculated from the product of the length of the trench and the specified trench width plus 400 mm (refer PSDB 5.4).

PSDB 8 MEASUREMENT AND PAYMENT

PSDB 8.1.4 Basic Principles

Delete the Sub-Clause and substitute:

Except that the volume will be computed as specified in 8.2.3, the requirements of Sub-Clause 5.2.5.1 (Freehaul) of SABS 1200 D as amended and as relevant, shall apply to freehaul.

PSDB 8.3.2 Excavation

Delete Sub-Clause and substitute:

a) Excavation in all materials for trenches and dispose of surplus material. Rate to include for all temporary works including trimming, shoring and dewatering as required.
b) Excavate by hand in soft material up to a maximum depth of 1,5m for trenches and dispose of surplus or unsuitable material. Rate to include for all temporary works including trimming, shoring and dewatering as required.

Hand excavation (measured in place) of SOFT material in following Classes:
(1) SOFT Class 1 ..... Unit : m^3
(2) SOFT Class 2 ..... Unit : m^3
(3) SOFT Class 3 ..... Unit : m^3

Items will be provided for various pipe diameters to trench base widths as specified in 5.2 and various

depths in increments of 0,5m measured to the bottom of the bedding layer (see Drawings DB-2, DB-3 & DB-4).

Where measured volumetrically in terms of 8.1.2(a), the volumes of excavation will be computed accordance with 8.2.2 & 8.2.3

c) Extra-over item (a) above for:
(1) Excavation in Hard rock material ..... Unit : m^3
(2) Excavation in Boulder Class A material ..... Unit : m^3
(3) Excavation in Boulder Class B material ..... Unit : m^3

Separate items will not be provided for depth increments. Volume will be computed from the trench width determined in accordance with 8.2.3 and the depth from the top of the intermediate or hard rock excavation, as the case may be, either to the bottom of the same material or to the bottom of the trench as specified in (a) above, whichever is the lesser (see Drawing DB-5).

The rates shall cover the cost of the excavation and handling of the material as classified and the disposal of rock and other surplus or unsuitable material.

Measurement of Extra Over for (3) and (4) above will not apply to any length of trench in soft material more than 2 m long. Surplus boulder material from trench excavation shall where applicable, be disposed of to the designated spoil areas except where shown otherwise on the drawings.

d) Backfill and Compact in all trenches for pipes up to DN355 Unit : m^3

e) Extra-over item (d) above for backfill stabilised with 5% cement where directed by the Engineer Unit : m^3

The tendered rates for (d) & (e) above shall include full compensation for selecting, mixing, backfilling and compacting of the stabilised material to 90% of modified AASHTO density. Unit : m^3

PSDB 8.3.3.1 Make up deficiency in Backfill Materials

No payment will be made for additional backfill material in the trenches due to overbreak, etc. The Contractor must allow for such costs in the tendered rates for excavation measured under PSDB 8.3.2

Payment for imported, graded stone laid under pipelines in accordance with PSDB 5.5 shall be paid for under either Sub-Clause 8.3.3.1(a) or (b) or (c) as scheduled.

PSDB 8.3.3.4 Overhaul

Delete the Sub-clause and substitute:

All haul will be regarded as free haul. There will be no overhaul payment in this contract.

PSDB 8.3.4(c) Cross Embankments (New Sub-Clause)

Payment for cross embankments will be by volume of embankment constructed in accordance with the specification. Unit : m^3

PSDB 8.3.5 Existing Services that Intersect or Adjoin a Pipe Trench

Add to the end of the Sub-Clause:

(v) all work involved in locating the service by hand excavation
(vi) notifying and attending upon the proprietor of the service
(vii) supporting and protecting the service while the pipeline is installed, inspected, tested and backfilled.

PSDB 8.3.5(c) Excavate by hand to expose existing services (New Sub-clause)

Excavate existing services…….. Unit : m^3

Where existing services are shown on the drawings or where the existence thereof can be reasonably expected, the Contractor shall in conjunction with the relevant authority(ies) determine the exact depth and location of such services before the commencement of construction. (refer to Clause 5.1.4).
The rate shall cover all costs to excavate by hand to locate the service and backfill to original levels.

PSDB 8.3.6.2 Grassing (New Sub-Clause)

Grassing ..... Unit : m^2

Where directed by the Engineer, approved grass shall be planted after topsoiling has been completed. The planted area shall be neatly trimmed, fertilised and watered. The Contractor shall ensure that the planted areas are not permitted to dry out. Any grass that fails to grow shall be replaced by the Contractor, at his own expense, with fresh grass, until satisfactory cover is obtained. The rate shall cover the supplying, planting and maintenance of grass, all in accordance with this specification.

PSDB 8.3.8 Sack Breakers (New Sub-Clause)

Where directed by the Engineer, sack breakers shall be installed from the bottom of the bedding to 300 mm below finished ground level. .....Unit : No

PSDB 8.3.9 Excavate Trial Holes to Determine Method of Excavation (New Clause)

Hand excavation of trial holes .....Unit No

Excavation by hand of trial holes of minimum dimensions 1,0 x 1,0 m to depth of 800 mm, or less if intermediate or hard rock material is encountered, along all pipeline routes at 50 m intervals. Including use of DCP for classification of material.

Including backfilling of the trial holes when notified by the Engineer.

PSDB 8.3.10 Relocation of Services (New Clause)

A Provisional Sum has been included for the relocation of existing services where directed by the Engineer to new positions and/or alignments..... Unit : Prov Sum

C3.7.6 PSDK : GABIONS AND PITCHING (Applicable to SABS 1200 DK - 1996)

PSDK 3 MATERIALS

PSDK 3.1.1 Stone

Add to the Sub-Clause:

Stone that is hard and unweathered may be selected from the earthwork excavation. Where no suitable stone is available from excavation the supply shall be at the Contractor's option. The transport of the stone shall be included in the rate for supply.

The stone shall be subjected to both the weathering and the durability tests (see Sub-clauses 7.3 and 7.4).

PSDK 3.1.2 Gabion cages

Add to the Sub-Clause:

The wire used for the fabrication of gabion boxes and mattresses and for lacing and bracing operations shall be to SABS 675 and galvanised for Class A – heavy galvanised mild steel wire. No PVC coating will be required.

The gabion baskets and mattresses shall be as follows:

Gabion boxes constructed of double twisted, hexagonal wire mesh gabions of nominal 80 mm mesh, with 3,4 mm o/d frame wire and 2,7 mm o/d mesh wire. Complete with partitions at 1 m centres. All wire is mild steel to SANS 1580 - 2005, Class A, zinc coated by heavy duty hot dip galvanising to SANS 675 - 2007.

Each basket shall be complete as described in SANS 1200 DK.

PSDK 3.1.3 Geotextile

Add to the sub-clause:

The filter blanket shall consist of "non-woven" spun bound polyester fabric having a mass of 210 g/m^2, permeability of 0,003 m/s and multi-direction tensile strength of 16 000 N/m such as KAYMAT Grade U24.

The filter blanket must be attached to the gabion wall, basket or mattress by an approved method of fastening, which must ensure that the blanket will stay in position during construction of the infilling behind the gabion wall. The material to be used as fill immediately adjacent to the gabion wall must have good drainage properties to ensure that there is no build up of pore pressure behind the wall and be free of sharp rocks that could damage the filter blanket.

PSDK 3.2.1 Stone

Add to the Sub-Clause:

Medium pitching, as stated in Table 2 of 3.2.1 shall be used in this contract.

PSDK 3.2.3 Wire netting

Add to the Sub-Clause:

Wire netting for gabion and mattress cages shall be hexagonal steel wire mesh strengthened by selvedges of heavier wire and by mesh diaphragms that divide the cases into 1 m compartments.
Nominal 80 mm mesh shall be used for gabion cages with 2,4 mm diameter galvanised steel

wires.

Nominal 60 mm mesh shall be used for mattress cages with 2,0 mm diameter galvanised steel wires.

Selvedge wire shall be galvanised and the diameter shall be in accordance with Table 3 of SABS 1200 DK.

PSDK 5 CONSTRUCTION

PSDK 5.1.2 Lacing of Cages

Add to the Sub-Clause:

Each diaphragm shall be connected in the same manner to the sides and top panels in addition to the bottom panel. All gabion and mattress cages shall be connected to adjacent gabion and/or mattress cages by lacing the adjacent selvages together with galvanised steel wire.

PSDK 5.1.3 Type of cage (New Sub-clause)

The size of cages for gabions and mattresses shall be as shown on the drawings and measured in the Schedule of Quantities.

PSDK 5.1.4 Diaphragms (New Sub-clause)

Each diaphragm shall be connected in the same manner to the sides and top panels in addition to the bottom panel.

PSDK 5.2.2 Geotextile or Geomembrane (New Sub-clause)

(c) Filter blankets may be required behind the gabion baskets in order to prevent leaching of the embankment material through the gabion retaining structure and revetments. The Engineer may order, in writing, that the inside face of the gabion wall shall be lined with a filter blanket.

PSDK 5.2.3 Assembly

Add to the Sub-Clause:

All gabion and mattress cages shall be connected to adjacent gabion and/or mattress cages by lacing the adjacent selvedges together with 2,0 mm dia. galvanised steel wire. The lacing shall be in accordance with Sub-Clause 5.1.2.

PSDK 5.2.4 Rockfilling

Add to the Sub-clause:

Particular care shall be taken in the filling gabions and mattresses so as to ensure that the voids in the rockfill are reduced to the minimum that can be reasonably achieved. In order to minimise the voids in the rockfilling, the filling shall proceed in layers not exceeding 300 mm deep and each layer shall be rodded and barred so as to compact the rockfill before filling of the next layer commences. Where appropriate, hand packing of selected rock particles shall be carried out.

PSDK 5.2.4.2 Mattresses used in revetments and aprons

Add to the Sub-clause:

Where gabions and mattresses are placed in exposed positions the rock particles forming the exposed faces shall be specially selected so as to present a fair and even surface.

PSDK 5.3.4 Wired Pitching

Add to the Sub-Clause:

The areas in which wired or grouted wire pitching is to be used will be indicated on site by the Engineer.

PSDK 5.3.6 Rock Bolsters (New Sub-Clause)

Where rock bolsters are specified or directed by the Engineer (in particular below the outlet of stormwater pipe culverts), the rock shall be dumped or pushed into place as indicated by the Engineer. The heap of rock shall conform to the dimensions, i.e. length, width, height ordered by the Engineer, to a tolerance of 300 mm.

PSDK 8 MEASUREMENT AND PAYMENT

PSDK 8.2.3 Extra-over 8.2.2 for Packing Selected Stone for Exposed Face

Add to the Sub-Clause:

The method of selecting and packing stone for exposed faces as scheduled shall be as specified in Sub-clause 5.2.7 - Special Finish.

C3.7.7 PSG: CONCRETE (Structural) (Applicable to SABS 1200 G - 1982)

PSG 3 MATERIALS

PSG 3.2 Cement

PSG 3.2.1 Applicable Specifications

Add the following:

"Where reference is made in this specification or the Standard Specifications to the cement specifications, e.g. SABS 471: Portland cement and rapid hardening Portland cement, it shall be replaced with the new specification.

SABS ENV 197-1: Cement-composition, specifications and conformity criteria.
Part 1: Common Cements

Furthermore, where reference is made in this Specification or the Standard Specifications to the different cement types, the following new names shall apply:

Old product nomenclature	Typical new product nomenclature	
	Cement type	Cement strength class
OPC	CEM I CEM I	32,5 32,5R
RHC	CEM I CEM I	42,5 42,5R
LASRC	No provision made	No provision made
PC15SL	CEM II/A-S CEM II/A-S CEM II/A-S	32,5 32,5R 42,5
PC15FA	CEM II/A-V CEM II/A-V CEM II/A-W CEM II/A-W	32,5 32,5R 32,5 32,5R
RH15FA	CEM II/A-V CEM II/A-V CEM II/A-W CEM II/A-W	42,5 42,5R 42,5 42,5R
PBFC	CEM III/A CEM III/A	32,5 32,5R
PFAC	CEM II/B-V CEM II/B-W	32,5 32,5
RH30SL	CEM II/B-S CEM II/B-S	32,5R 42,5
RH40SL	CEM III/A CEM III/A	32,5R 42,5
Masonry cement	MC MC MC	12,5 12,5X 22,5X

Only Ordinary Portland Cement (O.P.C.) shall be used on the Works. In the case of Strength Concrete and as a substitute for a portion of the cement it is required that

between 15% and 30% of the O.P.C. be replaced by Pulverised-fuel ash (Pfa) complying with ASTM C618 (Class F). The choice and proportions of pozzolans in substitution for a portion of the O.P.C. will form a part of the Strength Concrete mix design specified in /clause PSG 3.2.4."

All cement of a particular type shall be supplied from the same source for the duration of the Contract."

PSG 3.2.2 Alternative Types of Cement

Add the following: .....

"Pulverised Fly Ash (PFA) used on the works shall be from an approved source and shall comply with the requirements of SANS 1491 part II"

PSG 3.2.3 Storage of Cement

Add the following:

"Cement shall not be kept in storage for longer than 4 weeks without the Engineer's permission. Cement, if not delivered in bulk for storage in an approved silo, must be stored in a separate room with a raised floor constructed of heavy planks supported on bricks, or similar. This room must be completely damp-proof and well ventilated. Cement must be used in the order that it is delivered. Any bags of cement that show any degree of hydration or setting shall be removed from the site and replaced at the Contractor's expense. Copies of all waybills for cement deliveries shall be submitted to the Engineer."

PSG 3.3 Water

Add the following:

"If potable water is not used in the concrete, samples of the water that it is proposed to use for the concrete shall be submitted to the Engineer for his approval in terms of Clause 3.1."

PSG 3.4 Aggregates

PSG 3.4.1 Applicable Specification

Add the following

"After the approval of aggregates and prior to commencing production of concrete the Contractor shall ensure continuity of supply of the selected aggregates. Any colour or texture variations of exposed concrete due to changes in aggregates during the Contract shall be rectified by the Contractor at his own cost. Any such remedial measures shall be approved by the Engineer before commencement thereof."

PSG 3.5 Admixtures

PSG 3.5.1 Approval of Admixtures Required

Add the following:

"Admixtures may be used in concrete mixes provided their use has been approved by the Engineer. To facilitate approval, the Contractor shall provide the following information: -

- The trade name of the admixture, its source and the manufacturer's recommended method of use
- Typical dosage rates and possible detrimental effects of under-dosage and over-dosage.
- Whether compounds (such as those containing chloride in any form as an active ingredient) likely to cause corrosion of the reinforcement or deterioration of the concrete are present and, if so, the chloride content (expressed as chloride ions or as equivalent anhydrous calcium chloride) by mass of admixture.
- The method and accuracy of dispensing the admixture.
- Generally, admixtures that improve workability and water retention shall comply with AASHTO M194 "Chemical Admixtures for concrete""

Add the following new sub-clause:

"PSG 3.9 Jointing Materials

PSG 3.9.1 Waterstops

Waterstops shall be a proprietary design consisting of flexible polyvinylchloride.

Tensile strength	:	15 MPa (min.)
Elongation at break	:	250% (min)
Hardness (ASTM D1706)	:	70 ±5
Cold crack temperature	:	25°C
Water absorption (48h at 50°C)	:	0,5 % (max.)

PSG 3.9.2 Joint Sealer

Joint sealer shall be a two-component polyurethane base sealing compound or similar approved sealer. The joint sealer shall have a movement tolerance of 25% (min) and shall be capable of withstanding extension and compression over a wide range of moisture and temperature conditions without deterioration. Two component polyurethane sealers shall comply in all respects with SABS 1077-1984, "Sealing Compounds for the Building and Construction Industry, Two-Component Polyurethane - Base."

PSG 3.9.3 Joint Filler

Joint filler shall be a non-absorbent, closed cell, polyethylene filler, having a density of at least 45 kg/m^3. The joint filler shall have a load bearing capacity of 0,2 MPa for 50% compression; moisture absorption shall not exceed 3% by volume.

Fillers shall be provided with a tear out strip for forming the specified recess for the sealant, inclusive of the bond breaker, which shall be an approved PVC tape."

PSG 4 PLANT

PSG 4.5 Formwork

PSG 4.5.3 Ties

Delete Sub-Clause 4.5.3 and replace with:

"The types of ties used and their position shall receive careful attention and be subjected to the approval of the Engineer.

Ties shall not be left embedded in the concrete closer to the face of the concrete than the minimum specified cover to reinforcement. If plastic sheaths are used to permit removal of metal ties, the sheaths are to be removed and the holes are to be completely

removed by using an oversized drill bit to ream out the holes.

The surface of the hole is to be primed by wetting with a cement/SBR latex slurry and the hole filled by caulking with a cementitious mortar consisting of 1 part cement to 2 parts concrete sand by volume, well mixed with sufficient clean water to obtain the required consistency. The grout is to be well rodded into the hole to completely fill same and provide a dense void free plug. The surface is to be troweled to finish flush with the surrounding area.

Tie cone recesses and ferrule/tie holes shall be plugged within 48 hours of casting the concrete. The surfaces of tie cone recesses shall first be roughened by wire brushing.

Where the tie cone recesses and ferrule/tie holes cannot be plugged within 48 hours of casting, they shall be roughened by scabbling and a wet to dry epoxy shall be applied before plugging.

The mortar plugs shall be properly cured."

PSG 5 CONSTRUCTION

PSG 5.1 Reinforcement

PSG 5.1.2 Fixing

Add the following:

"Sufficient joints shall be made so that the entire reinforcement cage is rigid and to the satisfaction of the Engineer. Tie wire shall not encroach on the specified minimum cover by more than a single strand thickness.

Welding of the reinforcement shall not be permitted.

Spacers to be used shall be of approved design.

Where mortar blocks are used as spacers, they shall be properly shaped so as not to slip out of position and shall be made of the same mix as the mortar of the concrete in which they are to be placed.

The mortar shall be well compacted by approved means into the moulds and the mortar blocks shall be cured in water for at least 7 days before being fixed in place."

PSG 5.1.3 Cover

The exposure conditions for all water retaining structures, structures below ground etc. shall be considered as being "severe".

PSG 5.2 Formwork

PSG 5.2.1 Classification of Finishes

Add the following:

"Smooth rubbed finish shall be produced on freshly hardened concrete. All necessary patching shall have been done immediately after the forms have been removed and rubbing shall be completed not later than the following day. Surfaces shall be wetted and rubbed, first with a coarse carborundum stone followed by a smooth carborundum stone, or other similar abrasive until a uniform colour and texture is produced. No cement grout or slurry shall be used during the rubbing process. The character of the materials used and the care with which forms are constructed and concrete placed are factors in determining the amount of rubbing required."

PSG 5.2.2 Preparation of Formwork

Add the following:

"Panel joints for formwork shall be horizontal or vertical and arranged to match symmetrically throughout the structure.

PSG 5.5 Concrete

PSG 5.5.1 Quality

PSG 5.5.1.1 General

Add the following: -

"Unless specifically stated in the Project Specification Prescribed Mix Concrete will not be used"

PSG 5.5.1.5 Durability

The exposure conditions shall be considered as being "severe". The maximum water/cement ratio shall be 0,5 unless otherwise stated on the drawings.

PSG 5.5.1.6 Prescribed Mix Concrete

Delete the Subclause in its entirety and replace with:

"Unless the Design mix is detailed on the drawings or in the Specification, all concrete shall be Strength concrete."

PSG 5.5.1.7 Strength Concrete

Delete Clause 5.5.17 in its entirety and replace with:

"The Contractor shall employ the services of an approved materials laboratory for the design of strength concrete mixes. The following shall be taken account of:

(a) The intent of the mix design is to ensure, for every part of the structure, homogeneous concrete which will have the required strength and durability

(b) The use of approved fine and coarse aggregates

(c) Compaction by vibration

(d) Mass batching

(e) Slump not exceeding the requirements stated in Table 3 of SABS 1200 G

(f) The necessity to design the mix using OPC and the part substitution with an approved pozzolan

(g) Utilizing the minimum specified cement content for reasons of durability and imperviousness

The following classes of Strength Concrete together with essential requirements are tabulated below:

STRENGTH CONCRETE			
Class of Concrete MPa/mm	**Min. Mass Cement Per m^3 Concrete Kg**	**28 Day Design Cube Strength MPa**	**28 Day Works Cube Strength MPa**
20/19	300	24	20
25/19	340	30	25
30/19	380	35	30
35/19	420	40	35

Add the following new Subclause:

PSG 5.5.1.8 No Fines Concrete

No fines concrete shall consist of a mix of 50kg cement and 0,30 m^3 of coarse aggregates with a water/cement ration of approximately 0,46. The aggregates shall be Graded in such a way that not more than 10% of its mass is retained on a 19mm sieve and not more than 5% of its mass passes a 6,7mm sieve.

The quantities of water used shall be just sufficient to form a smooth Grout to completely coat all surfaces of the aggregates.

The no fines concrete shall be mixed for at least 3 minutes in a mechanical mixer. The aggregates shall first be mixed with half the quantity of water before adding the cement and remaining water.

No fines concrete shall be placed in continuous horizontal layers within 15 minutes of mixing. It shall be worked sufficiently to completely fill the shutter but excessive tamping, ramming or any form of vibration shall not be allowed.

The upper surfaces of no fines drainage layers below structural floors of water retaining structures shall be screeded to level and then sealed against the ingress of foreign matter by applying sufficient 1: 8 dry mix plaster and wood floating to close the surface voids.

Curing shall be as per Clause 5.5.8 of SABS 1200 G."

PSG 5.5.3 Mixing

PSG 5.5.3.1 Mixing at Construction Site

Add the following:

"i) Site batching shall be by mass using an approved type of weigh-batching plant."

PSG 5.5.3.2 Ready Mixed Concrete

The use of Ready Mixed Concrete shall be subject to the approval of the Engineer.

PSG 5.5.5 Placing

Add the following:

"For closed circuits such as circular or rectangular water retaining structures for which no

vertical joints have been detailed on the drawings, work shall commence at one or more points in the circuit and proceed in opposite directions at the same time so that on completion of the circuit the junction or junctions are formed with freshly placed concrete. The height of the lift shall be carefully pre-planned so that the concrete can be placed in one continuous operation over the entire perimeter of the wall. No unauthorised vertical or inclined construction joints of any kind will be permitted in continuous walls."

PSG 5.5.6 Compaction

Add the following:

"The tops of all walls and columns shall be re-vibrated within 3 hours of the concrete having been placed"

PSG 5.5.7 Construction Joints

Delete the contents of Clause 5.5.7 and replace with:

PSG 5.5.7.1 Special note

Construction joints are a potential source of weakness in the strength, watertightness and appearance of the structure and they shall be positioned and treated with particular care.

PSG 5.5.7.2 Location

(a) Construction joints shall be located as shown on the drawings or to the approval of the Engineer. The spacing of joints shall depend on the volume of concrete that can be properly placed in a normal shift.
(b) Construction joints shall be fixed in advance of the concreting operation.
(c) In general construction joints shall be positioned at the points of maximum compression, minimum shear and at right angles to the main reinforcement.
(d) Where smooth shutter finishes are specified the joints shall coincide with the edges of the shutter boards or panels.
(e) All joints shall be truly vertical or horizontal unless otherwise specified.

PSG 5.5.7.3 Bonding Fresh Concrete to Old

The following methods shall be used:

(a) Existing concrete less than 4 hours old:

(i) Horizontal joints: Place original concrete 25 mm higher than level of joint and strike off surplus concrete as in Clause PSG 5.5.7.4. Place fresh concrete.

(ii) Vertical joints: Remove shutter 1 hour to 2 hours after fresh concrete is placed. Carefully roughen surface with wire brush or compressed air to expose coarse aggregates and remove loose material. Place fresh concrete.

(b) Existing concrete between 4 hrs and 3 days

(i) Horizontal joints: After removing 25 mm of surplus concrete as described in Clause PSG 5.5.7.4 brush the old concrete thoroughly with a wire brush to expose the coarse aggregates.

Alternatively use sand blasting. Wash joint with clean water to remove all laitance, dirt and loose particles.

Just before placing fresh concrete apply a thin layer of plastic mortar to the surface of the existing concrete. The mortar shall consist of cement and sand

mixed in the same proportion as that contained in the concrete mix (i.e. omitting coarse aggregates). The mortar shall still be plastic when the fresh concrete is placed against it.

(ii) Vertical Joints: Roughen the surface with a wire brush to expose coarse aggregates and remove loose material. Alternatively use sand blasting. Then treat as for horizontal joint in (b) (i) above.

c) Existing concrete more than 3 days old:

(i) Horizontal joints: As for (b) (i) above with the addition that the construction joint surface shall be kept continuously damp for 24 hours before the plastic mortar and fresh concrete are placed, but no free water shall be visible on the surface prior to placing the mortar.

(ii) Vertical joints: As for (b) (ii) above with the addition that the construction joint surface shall be kept continuously damp for 24 hours before the plastic mortar and fresh concrete are placed.

d) Adhesives:

Proprietary adhesives may be used for bonding concrete at easily accessible construction joints (e.g. slabs and beams) subject to the approval of the Engineer.

The manufacturer's instructions shall be followed by the Contractor. In general the existing concrete shall be prepared as described in (b) (i) above.

PSG 5.5.7.4 Horizontal Joints

Unless otherwise specified or shown on the drawings all horizontal joints shall be formed by striking off the top 25 mm of concrete approximately 1 hour after it has been compacted, working to the top of the line formed by the gauge strips specified below.

PSG 5.5.7.5 Gauge Strips

To give all joints in the outer surface of the reservoir a straight-line finish where smooth shutter finishes are specified, 40 mm x 40 mm rebated gauge strips shall be fixed inside the shutters at the joint positions and removed before the new concrete is cast.

PSG 5.5.7.6 Keyed Joints

Joints in beams and slabs shall have keyed faces to transmit shear.

PSG5.5.7.7 Joints Parallel to Main Reinforcement

These joints shall be subject to the approval of the Engineer and shall be formed only when absolutely necessary. The Engineer may order additional splice bars and other load transfer devices to be provided at the joint. No extra payment shall be made for the additional material or labour if such construction joints are requested by the Contractor.

PSG 5.5.7.8 Column Joints

These joints shall be treated as for "Horizontal Joints" except at joints with slabs or beams. In this case it shall project 25 mm into the soffit of the slab or beam when the excess concrete has been struck off as described.

PSG 5.5.7.9 Shuttering at Joints

To obtain joints free from projections the shutters for the new concrete shall be tightly fixed to the existing concrete by means of additional bolts, wedges or clamps. In all possible cases the shutters shall overlap the joint and not be disturbed until the new concrete has hardened."

PSG 5.5.9 Adverse Weather Conditions

Add the following:

"If plastic shrinkage cracking occurs, the cracks shall be closed up by re-vibrating the concrete with a poker vibrator, within 3 hours of casting. Once the cracks have been closed, the concrete shall be kept thoroughly wet, or covered with plastic sheeting for at least a further 3 hours."

PSG 5.5.11 Watertight Concrete

Delete the contents of Clause 5.5.11 and replace with the following:

"All reinforced concrete structures in this Contract shall be deemed to be water retaining structures and have been designed accordingly. Water retaining structures are subject to the provisions of the following Sub-Clauses:

PSG 5.5.11.1 Pipes and Conduits Embedded in Concrete

Except with the written approval of the Engineer, no pipes other than those shown on the drawings shall be embedded in concrete and the approval of the Engineer for the position of all services to be embedded shall be obtained before concreting commences. The clear space between pipes of any kind embedded in reinforced concrete and the clear space between such pipes and reinforcement shall not at any point be less than;

(a) 40 mm or

(b) 5 mm plus the maximum size of coarse aggregates, whichever is the Greater.

PSG 5.5.11.2 Grouting of Pipes and Specials Through Walls:

Where entry holes for pipes/specials have been provided in walls the Contractor shall be responsible for the Grouting-in of such pipes/specials, regardless of whether or not these have been supplied by himself.

Before commencing the positioning in holes of any pipes/specials the Contractor shall;

(a) remove all shuttering and boxing remaining in the holes;

(b) make any alterations required to the position and shape of the holes;

(c) thoroughly scabble and clean the sides of the holes so as to obtain a satisfactory bond surface for the new concrete; and

(d) free all surfaces of the pipes/specials of all coatings, and thoroughly scrape and clean the pipes/specials.

After accurately positioning the pipes/specials in their respective holes, the Contractor shall fix the pipes/specials in the holes.

Immediately before Grouting is carried out by the placing of mortar and concrete around the pipes, the surface of the existing concrete shall be saturated with water. All surplus water shall be removed and the surface covered with a layer, approximately 12 mm thick, of mortar consisting of 3 parts of concrete sand and 1 part of cement.

The concrete ingredients shall be mixed and placed as dry as possible to obtain a dense, waterproof concrete. Where a watertight seal is required, the concrete shall be carefully worked around the puddle flange, if any, and the pipe barrel or body of the special, and shall be vibrated in layers so as to obviate any falling away from pipe/special surfaces of the concrete already placed. The hole shall, when set, form a dense, homogeneous, and waterproof mass. A spare vibrator with an independent power source shall be kept in readiness to ensure continuity of placing in the event of the breakdown of the duty vibrator.

Smooth formwork that has been suitably strengthened for use with a vibrator shall be provided for facing the concrete around each pipe/special.

PSG 5.5.11.3 Test for Watertightness

All measures required for obtaining, purchasing, tankering, pumping and/or piping the water are to be included in the price for testing.

Concrete work, which is required to contain water shall not be accepted as complete until it has been proved by test to be watertight. Testing shall not commence sooner than 14 days after the structure has been completed.

Neither backfilling around the Works up to original Ground level nor banking around structures will be permitted until after the satisfactory completion of the appropriate stages of testing for watertightness in accordance with the provisions of this Clause as set out hereunder.

Water retaining structures are to be tested for watertightness at four stages unless otherwise ordered by the Engineer; one at quarter-full depth of water, one at half-full, one at three-quarter-full and one at normal full level. In each case as soon as the water surface is reasonably steady after filling, the water level is to be established and recorded by the Engineer each successive 24 hours and the results Graphed so as to establish a Progressive rate of absorption and leakage. To make allowance for variations caused by evaporation or rainfall in the case of un-roofed structures a watertight open-topped container of at least 2 m^2 plan area by 1 m deep 80% filled with water shall be floated on the water and moored. By taking measurements of the water level in the container, the losses or gains due to evaporation or rainfall will be assessed.

If the rate of leakage at any stage exceeds 2 mm per 24 hours at the end of 7 days, or if damp patches are apparent on the concrete face remote from the contained water, and there no prospect, in the opinion of the Engineer, of the leakage reducing to tolerable limits, he shall have the right to deem the structure to be not watertight and to notify the Contractor accordingly, who shall take such steps at his own expense and to the approval of the Engineer, as may be considered necessary to achieve watertightness, other than by plastering. In the event of the measures taken by the Contractor proving ineffective in reducing the drop in water level over a period of 7 days to less than 2 mm per 24 hours, and/or the apparent dampness externally to limits which are considered tolerable by the Engineer, he shall have the right to order the Contractor to plaster or coat with an approved product the floors and inside faces of walls and the Contractor shall at his own expense carry out this work to the approval of the Engineer.

On completion of this work and after cleaning out the structure it shall again be tested in the manner specified and at the Contractor's cost. If the retest fails to reveal a satisfactory degree of watertightness, the Contractor shall carry out such other measures at his own expense as may be directed by the Engineer.

In the event of leakage being evident at any time during the Defects Liability Period, the Engineer before issuing the Final Certificate may call for further testing and rectification as already described, and will have the right to withhold his Certificate until he considers the work to be satisfactory.

PSG 5.5.11.4 Cleaning and Disinfection

Before being put into use all structures which will contain potable water are to be thoroughly cleaned out and disinfected inside. All measures required for obtaining, purchasing, tankering, pumping and/or piping the water are to be included in the price for cleaning and disinfecting

The disinfection criteria are stringent and the Contractor is encouraged to make every effort to ensure that the reservoir is kept clean through the duration of the contract.

While the reservoir is being filled with water, a sodium hypochlorite solution shall be dosed to achieve a theoretical total chlorine concentration of 25ppm.

Once the reservoir has been filled with water, it shall be left for a 24-hour period. Thereafter total chlorine concentration shall be measured. A concentration of 20ppm total chlorine will be considered acceptable. Should such concentration not be achieved, the Contractor shall carry out, at his own cost, all steps deemed necessary by the Engineer to achieve satisfactory disinfection.

Once satisfactory disinfection is achieved, the reservoir shall be drained and sufficient sodium thiosulphate (typically 1 part/part of total chlorine) shall be dosed into the system to fully neutralise the chlorine before discharging to watercourse.

The reservoir shall then be filled and after 24 hours samples shall be taken by an independent laboratory for analysis (at no additional charge). Should the following limits not be achieved, the Contractor shall carry out, at his own cost, all steps deemed necessary by the Engineer to confirm satisfactory disinfection."

PARAMETERS	COUNT
E Coli	0
Coliform	0
Faecal Streptococci	0

Insert the following new Clauses:

PSG 5.5.16 Expansion Joints

PSG 5.5.16.1 Location

(a) Expansion joints shall be located as shown on the drawings.

(b) Where smooth shutter finishes are specified the edges of the shutter boards or panels shall coincide with the joints.

(c) All joints shall be truly vertical or horizontal unless otherwise specified.

PSG 5.5.16.2 Forming Joints

All expansion joints shall have a shuttered face. The shuttering shall be fixed firmly in position and shall be split as required to accommodate waterstops and/or dowel bars without loss of mortar at the joint.

To obtain a joint free from projections the shutters for the new concrete shall be tightly fixed

to the existing concrete. Where possible the shutters shall overlap the joint and not be disturbed until the new concrete has hardened.

Joint recesses are to be formed to the dimensions and shapes indicated on the drawings. The recesses are to be formed by means of untreated clean timber with rough sides and so shuttered that the shuttering is rigidly fixed during placing of concrete and can be removed without any timber having to be left in the recesses. Shuttering shall be left in the joint until these are ready for sealing, whereupon the shuttering shall be removed and the surfaces of the recesses shall be thoroughly cleaned by light hammering with a chipping hammer and wire brushing to remove all laitance oil and moisture traps, and by heating with a blow-lamp; care shall be taken not to overheat the concrete.

PSG 5.5.16.3 Construction

(a) Each section of premoulded waterstop shall be of the maximum practicable length so that the number of end joints will be minimised. Continuous seals are to be obtained in the field by jointing the waterstops by heat fusion using suitable jigs and heating tools. Joints shall develop effective watertightness equal to that of the continuous material and shall permanently develop the full mechanical strength of the parent section and retain its flexibility.

Waterstops shall be securely and accurately located in position in the shutters before concreting commences. Nails, wires or other fastenings shall be used only in anchoring ribs.

Concrete around waterstops shall be properly placed and compacted to avoid honeycombing. To ensure full contact between the waterstop and the concrete around its periphery, concrete in the vicinity of the seal is to be well vibrated and the seal worked up and down by hand to expel entrained air, when the concrete has reached the level of the seal.

(b) Joint filler to the sizes and thicknesses shown on the drawings shall be fixed to the joint face before the adjoining concrete is cast.

(c) All recesses to receive joint sealer shall first be cleaned as described in Clause PSG 5.5.17.2. Thereafter a primer matched to the sealer, shall be applied by brushing it well into the sides of the joint to ensure complete coverage. Sealants shall be tooled into position for complete air-free filling of voids. The surface of the joint shall be smoothed with a clean spatula. To obtain neat straight line joints the adjacent concrete shall be suitably masked.

The preparation and priming of joint surfaces, the mixing of the components of the sealer, the application and tooling shall all be carried out strictly in accordance with manufacturer's instructions. Priming of joints shall not be commenced before the concrete has cured for at least 21 days.

(d) Sliding joints shall be formed where shown on the drawings. The upper concrete surfaces forming the sliding surface are to be steel trowelled to a smooth and level surface. Only when thoroughly set and dry and prior to the upper layer of concrete being cast thereon, shall these surfaces receive two coats of an approved bituminous paint."

PSG 7 TESTS

PSG 7.1 Facilities and Frequency of Sampling

PSG 7.1.2 Frequency of Sampling

PSG 7.1.2.2 Amend sub-clause 7.1.2.2 to read as follows:

Each sample for initial sampling during the first occasions that a mix is used on site shall comprise six test cubes, three of which must be tested at 7 days and the others at 28 days.

Each sample for subsequent testing shall comprise 4 test cubes, one of which must be tested at 7 days and the other 3 at 28 days. Samples for subsequent testing shall be taken at a rate by volume of not less than one sample per 20m³ of concrete cast or in the event of small volumes, at least one sample on each day that concrete of a particular grade is made.

Notwithstanding this schedule the Contractor shall arrange the exact details of numbers of samples to be taken with the Engineer at commencement of construction."

PSG 7.1.2.4 Delete this subclause

PSG 7.2.3 Laboratory Testing

Add the following:

All test cubes shall be made, cured and tested in accordance with the requirements of SANS Standard Method 863 and 864.

Test cubes shall be cured in an approved curing tank.

Delivery of cubes for testing shall take place not less than 24 hours in advance of the specified time for testing.

The Contractor shall keep accurate records of the exact position in the structure of the concrete batch represented by the cube test. All costs connected with sampling and testing of concrete, as described in this section of the project specification, shall be included in the relevant strength concrete rates.

PSG 8 MEASUREMENT AND PAYMENT

PSG 8.4 Scheduled Concrete Items

Add the following items:

"***PSG 8.4.7 Pipes and Conduits Embedded in Concrete***.....Unit: Number (No.)

Measurement will be the number of pipes or conduits embedded in the concrete in accordance with the dimensions and details given on the drawings.

The rate tendered shall include full compensation for all materials, equipment and work required to carry out the work as specified.

PSG 8.4.8 Grouting of Pipes/Specials through Walls.....Unit: Number (No.)

Measurement will be the number of pipes/specials Grouted into preformed entry holes in the concrete in accordance with the dimensions and details given on the drawings. Various pipe sizes and/or specials will be scheduled separately.

The rate tendered shall include full compensation for all materials, equipment and work required to complete the work as specified."

Add the following new items:

PSG 8.9 **Testing for Watertightness** ..... Unit: Lump Sum

PSG 8.10 **Cleansing and Disinfection** ..... Unit: Lump Sum

The payment for testing for watertightness and the cleansing and disinfection will be made once the Engineer is satisfied that the work is complete in terms of the specification."

PSG 8.11 **Reinforced Concrete Water Meter Chambers Complete**

Add the following new subclauses:

The unit rate shall cover the cost of the provision of the reinforced concrete water meter chamber complete as per the scheduled drawing and at the position as indicated on site and shall include all blinding, formwork, reinforcing, jointing, prescribed concrete, unformed surfacing finishing, water proofing and grouting and shall include for all specification requirements, materials, plant, construction methods, tolerances and testing requirements necessary for the construction of the water meter chamber to specification. (The rate excludes the excavation for the water meter chamber and the fittings to be installed in the chamber, but shall include all access hatches and access covers as per scheduled drawing) ……..... Unit: No

C3.7.8.....PSL: MEDIUM-PRESSURE PIPELINES .....(Applicable to SABS 1200 L - 1983)

PSL 2 INTERPRETATIONS

PSL 2.1.2 Supporting Documents

Add the following after item(s):

h) SABS HA related Project Specification
i) SABS HC related Project Specification
Particular Specification PB: Pipelines Valves has reference.
Particular Specification PC: HDPE Pipes and Fittings has reference.
Particular Specification PD: Disinfection of Pipelines and Fittings has reference.

PSL 2.3 Definitions

Add to the sub-clause:

Flexible pipe: The 200 to 355mm nominal diameter uPVC and steel pipes to be supplied and laid under this Contract shall be defined as being flexible pipes for bedding purposes.

PSL 2.4 Abbreviations

Add to the list of abbreviations:

CML: Cement Mortar Lined (steel pipe)

PSL 3 MATERIALS

PSL 3.1 General

Add to the Sub-Clause:

The types of pipe materials called for under this Contract are:

Steel, PVC and HDPE
Appurtenant couplings, fittings, bends, valves and specials.

PSL 3.1.1 Quality Control (New Sub-Clause)

The Contractor shall ensure that all materials used in the execution of the contract comply with the technical requirements specified.

The Contractor shall maintain accurate and up to date records of all materials, processes, process parameters and measurements necessary to ensure compliance with this specification.

PSL 3.1.2 Quality Surveillance (New Sub-Clause)

The Employer may appoint an independent body to carry out Quality Surveillance on its behalf. The Contractor shall provide all facilities and access to premises at all reasonable times as may be necessary for the independent inspectorate to carry out its function. The cost of Quality Surveillance will be reimbursed to the Contractor, except for surveillance resulting in rejection or a fruitless call when the cost incurred will be deducted from the amount to be reimbursed to the Contractor.

Advance notice of a minimum of 24 hours shall be given by the Contractor to the appointed inspectorate body when requesting inspection of any portion of the goods for acceptance, and a minimum of 3 working days before commencement of the Contract.
The Contractor's quality control records shall be available for inspection at all reasonable times. Copies of these records shall be made available on request.

Notwithstanding any surveillance carried out by the Employer the Contractor shall retain full responsibility for the quality of the goods supplied under the Contract.

All pipes shall be inspected on delivery to site and all defects shall be made good by the Contractor at his expense.

No payment shall be made until satisfactory test certificates have been provided. Such certificates shall be delivered by the Contractor to the Engineer under separate cover and not despatched with the deliveries of pipes.

PSL 3.3 CI Pipes, Fittings and Specials

Delete first sentence and replace with the following:

All cast iron pipes and pipe specials are to conform to SABS 546, BS 78, Part 2 and/or BS 2035 (Class “D” pipes or Class “CD” fittings) so far as they may apply and are not amended in the Schedule of Quantities. All cast iron pipes, fittings and specials shall be hydraulically works tested to a pressure of 2700kPa.

PSL 3.3.1 Puddle Collars (New Sub-Clause)

Puddle collars used as pipe anchorages shall be of the same dimensions as corresponding flanges but are to be undrilled. The collar shall be capable of transmitting a longitudinal force 33% greater than the internal hydraulic pressure to be applied when testing multiplied by the area of the bore; and under that condition the stress in the metal shall not exceed its yield stress.

PSL 3.4 Steel Pipes, Fittings and Specials

PSL 3.4.1 General

Add to the Sub-Clause:

All steel pipes, fittings and specials shall be to the dimensions and details shown on the drawings or schedule of quantities. All pipes, fittings and specials shall have their relevant item numbers painted onto the exterior surface prior to dispatch from the factory.

All steel pipework used is to be coated and lined with “Rilsan” or similar approved, with minimum thickness of 300 microns, prepared and applied strictly in accordance with the manufacturer’s instructions.

Alternative proposals (other than those scheduled) for jointing, lining and coating may be offered but the Tenderer shall submit detailed specifications with his tender. A sample of the alternative type of jointing or corrosion protection system proposed by the Tenderer shall be submitted to the Engineer's office within one week of the closing date of the tender.

The sides of taper pieces shall diverge at an angle of not more than 11° to each other. The Tenderer shall be responsible for the provision of strengthening webs, crotchplates, gussets etc as may be necessary to prevent excessive deflection or deformation of fittings and specials when subjected to hydraulic tests, and his rate for the work will be deemed to include for the design and provision of this reinforcing wherever necessary.

The pipe manufacturer shall obtain and make available to the Engineer a certificate or certificates from the steel manufacturer covering all steel used, showing by which process the steel was made and giving the chemical analysis of the steel and its physical properties. A record shall be kept of pipe serial numbers (see PSL 4.6) and the cast numbers of the steel used.
The pipe manufacturer shall supply written confirmation that all hand welding was carried out by coded welders.

PSL 3.4.2 Pipes of Nominal bore up to 150 mm

Delete the Sub-Clause and substitute:

"Steel pipes and fittings of nominal bore up to 150mm shall be galvanised of Medium or Heavy Class, plain-ended or flanged and complying with SABS 62, or Groove-ended pipes, fittings and couplings complying with SABS 815 Part 2, as specified on the drawings and in the Bill of Quantities. All piping and fittings supplied shall be hot dip galvanised".

PSL 3.4.3 Pipes of Nominal Bore over 150 mm

Insert in the second line between "applicable requirements of" and "SABS 719" the words;

"SABS 815 Part 2 for Groove-ended pipes, fittings and couplings or"

Add to the sub-clause:

All piping and fittings supplied shall be hot dip galvanised.

PSL 3.4.4 Fittings and Specials

Delete this Sub-Clause

PSL 3.4.5 Pipe Sizes and Lengths (New Sub-Clause)

The outside diameter, wall thickness and the end preparation of steel pipes to be supplied under this Contract shall be as per the relevant tables in SABS specification. All pipes shall be supplied exact length, subject to tolerances allowed in the respective specification.

PSL 3.4.6 Welds (New Sub-Clause)

Welding of pipes shall be carried out in accordance with SANS 9956-3 or other applicable SANS or ISO specification.

Pipes shall be manufactured from steel strips or plates continuously welded along the seams and the height of the inner weld reinforcement shall not exceed 1 mm. In the case of pipes to be used with couplings, the external weld reinforcement shall be ground flush with the outer wall of the pipe over a suitable distance from the end of the pipe.

PSL 3.4.7 Hydraulic Testing at Factory (New Sub-Clause)

Each pipe shall be hydraulically tested in accordance with SABS 719 Clause 7.3 or such specified test in accordance with the relevant SANS specification.

PSL 3.4.8 Fittings and Specials (Pipes over 150 NB) (New Sub-Clause)

PSL 3.4.8.1 General

All fittings and specials shall be manufactured from straight pipe specified elsewhere in this Specification; the pipe so used shall have satisfactorily passed the stipulated hydraulic pressure tests.

Grooved mechanical couplings shall be manufactured according to SANS 815 Part 2. Other fittings and specials shall be manufactured and tested in accordance with the specification for straight pipe and additionally with Section 8 of BS 534. The nominal dimensions of each fitting and special required are itemised in the Schedule of Quantities and 'exact length' tolerances shall be adhered to.
Bends shall generally be of the gusseted type having dimensions as given by Table 8 of BS 534 except where specified to the contrary in the Schedule of Quantities or where the Tenderer can offer a price advantage for supplying even curvature bends.

The manufacturer shall be responsible for designing and providing strengthening webs, crotch plates, gussets, etc. as may be necessary to prevent excessive deflection or deformation of fittings and specials when subjected to hydraulic tests.

PSL 3.4.8.2 Closure Pipes

Closure pipes, which are to be cut on site to the exact lengths, required, shall have the diametrical tolerances specified for the pipe ends applied over the full length of the pipe. Closure pipes shall be supplied in standard lengths.

PSL 3.4.8.3 Puddle Collars (New Sub-Clause)

Puddle collars used as pipe anchorages shall be of the same dimensions as corresponding flanges but are to be undrilled. The collar shall be capable of transmitting a longitudinal force 33% greater than the internal hydraulic pressure to be applied when testing multiplied by the area of the bore; and under that condition the stress in the metal shall not exceed its yield stress.

PSL 3.7 Other Types of Pipes

PSL 3.7.1 uPVC Pipes

Delete the sub-clause and substitute the following:

uPVC pipes shall comply with SABS 966-1 and be of the types, classes and fitted with joint systems as scheduled.

PSL 3.8 Jointing Materials

PSL 3.8.2.1 Flexible Couplings

Delete the Sub-Clause and substitute the following:

Grooved mechanical couplings shall be manufactured according to SANS 815 Part 2. Other flexible couplings shall conform generally to Clause 15 of BS 534 for slip-on type couplings and shall be of approved manufacture. They shall be provided without a central register, except where scheduled to the contrary in the Schedule of Quantities. They shall be capable of being tightened and released without damaging or improperly distorting the rubber seating rings and shall be designed to prevent the rubber rings being blown out under pressure or sucked in under vacuum.

The steel used shall conform to the appropriate British Standard Specification and each coupling is to be capable of withstanding the test pressure applicable to the pipes with which they are to be used without exceeding a stress in the steel of 67% of the yield point.

Couplings shall be protected by an approved epoxy coating system within 4 hours of abrasive blast cleaning the metal surfaces of the coupling in accordance with Swedish Standard SIS 05 5900 Grade SA 2,5. Nuts, bolts and washers shall be electro-galvanised. The plain end of the steel pipe shall be properly prepared before corrosion protection so as to accept the flexible coupling. Special anchoring flexible adaptor joints (“Viking Johnson” or similar) for connecting plain ended steel pipes to flanged joints are to be supplied complete with electrogalvanised bolts and nuts for connecting flanged joint to anchoring flange situated approximately 300mm from plain end of pipe.

PSL 3.8.3 Flanges and Accessories

PSL 3.8.3.1 Bolted Connections (New Sub-Clause)

All flanges, gaskets, bolts, nuts washers and other appurtenances required for the execution of the work under this Contract shall be supplied and installed by the Contractor under this Contract.

The dimensions and drilling of flanges shall be in accordance with the requirements of SABS 1123: Table 1600, 2500 or 4000 as scheduled except that, where low pressure interconnecting pipework for working pressures up to 1 000 kPa is being supplied, the

dimensions and drilling may be "SANS 1123, table 1000/3. All flanges shall be truly at right angles to the axis of the pipe or fitting and shall be drilled with bolt holes off centre.

Puddle flanges shall be of the same diameter and thickness as the end flanges and shall be undrilled.

Flanges cut from steel plate shall be machined flat on the front face, i.e. without a raised joint. No machining need be carried out on the back face (except where insulating flanges are to be installed) provided that face is sufficiently flat to ensure square bedding of the bolt heads and nuts and provided that all weld reinforcement is removed.

Cast or forged flanges shall be machined flat on the front faces and either spot faced at the bolt holes, or fully machined, on the back faces. Spot facing shall be at least 3 mm greater in diameter than the washers to be used, shall be truly parallel to the front face and the distance between the two faces shall be not less than the specified flange thickness.

- Temporary end covers shall be provided by the Contractor for protection of flanges, and prepared plain ends of pipes and fittings to prevent damage to internal lining during transportation and during handling on site.
- All piping and flanged surfaces shall be cleaned before connections are made.
- The (raised) faces of flanges that are in to be in contact with gaskets shall be masked and shall not be painted or coated. The mating flange shall then receive one coat of rust inhibitor (Plascon Rustix 84 or equal approved). Care shall be exercised to ensure that after the application of all coatings there are no runs or drips on the mating surfaces of the flanges and that the flange profiling is clearly visible over the entire face. Excessive coating build-up in flange bolt holes that could snag bolts will not be permitted.
- Flanged joints shall be connected with the specified bolts, nuts and washers, all of which are to be supplied by the Contractor.
- All bolts, tie-bolts, nuts and washers shall be galvanised to SABS 121:2000 and shall comply with the relevant requirements of SABS 135 – 1985 and SABS 136 – 1985 where applicable.
- The length of each bolt shall be such that after the bolt has been tightened, the end of the bolt shall project beyond the outer face of the nut, but not by more than two threads. Tie-bolts on restrained/anchoring couplings shall be fitted with “backing nuts” and washers.
- Each flanged joint is to be fitted with an approved and suitably rated gasket and sealed watertight such that there will be no visible sign of leakage under the specified factory and field test pressures and under the in-service working conditions (pressures).
- All bolts are to be tightened in a predetermined pattern with opposing bolts being tightened sequentially. When all bolts are tight, each bolt is to be torqued to the required/recommended torque in a predetermined pattern with opposing bolts being tightened sequentially.
- All bolt threads shall be liberally coated with “Copper slip” or similar approved compound prior to assembly. Upon completion, bolt heads, washers and nuts shall be wrapped with the “Denso Mastic Blanket System” comprising of a priming solution, mastic blanket, petrolatum tape and lay-flat sheeting as described elsewhere.

PSL 3.8.4 Loose Flanges for Welding

Add to the Sub-Clause:

Flange jointing material, when installed in the complete pipeline, shall be capable of withstanding transient pressures of up to the specified field test pressure. Under this condition no damage shall be caused or leakage occur through the joint. Bolts and nuts shall comply with SANS 1700. All bolts, nuts and washers shall be electro-galvanised.

PSL 3.9 Corrosion Protection

PSL 3.9.2 Steel Pipes

PSL 3.9.2.2 Steel Pipes of Nominal Bore over 150mm

a) Delete sub-clause 3.9.2.2 (a) and substitute:

in the case of bitumen coatings, all steel pipes, fittings and specials shall be coated in accordance with the requirement of SABS 1178:2002 Edition 1.02 – Type CB6A.

PSL 3.9.3 Protection Against Electrolytic Corrosion

PSL 3.9.3.1 Preparation of Steel Surfaces for Repairs and/or Reinstatement of Internal Lining and/or External Coating (New Sub-Clause)

Add new Sub-Clause:

Repair of steel pipe surface coatings and linings will be required following welding on site or any other activity that may damage the coating or lining. The Contractor shall provide a method Statement detailing how he proposes to go about preparing the surface to be repaired and the proposed materials and methods for 'make good' of the damaged surfaces, including relevant material specifications. Such proposal shall be subject to Engineer's approval.

Following the 'make good' procedure the Contractor shall be required to demonstrate the efficacy of the repair to the Engineer's satisfaction.

PSL 3.9.3.2 Insulation of fittings in contact with soil

All fittings shall be electrically insulated from contact with the bedding or backfill materials in accordance with the specifications set out elsewhere.

PSL 3.9.3.3 Measurement and Payment for Coatings (New Sub-Clause)

The supply and application of coatings are not measured separately in the Bill of Quantities and payment for the costs of meeting the requirements of this specification which includes for the provision of all labour, plant, materials and testing necessary to carry out the complete coating and making good etc shall be included in the rates tendered for the supplying, laying and bedding of the pipeline as per Sub-Clauses 8.2.1 and 8.2.2 of SABS 1200 L.

PSL 3.9.3.4 Coating of Permanently Exposed Pipes/Fittings (New Sub-Clause)

Add new Sub-Clause:

All pipes which are to be permanently exposed shall, in addition to the specified corrosion protection at flange/adaptor/anchoring joints, be protected with the "Denso Acrylic Pipeline Tape (Steelcoat 500)" system or similar approved UV resistant coating. The pipe surface shall be prepared and the coating applied in strict accordance with the manufacturer's instructions.

Surface Preparation:

The pipe surface to be wrapped shall be cleaned of dirt, grime, grease and other deleterious matter, using white spirit if necessary and then allowed to dry thoroughly.

Priming:

"Denso Primer D" shall be applied to the prepared surfaces at a nominal coverage rate of 8 m² per litre. Care shall be taken to obtain an even film with no runs or sags. Only those areas that are to be wrapped the same day shall be primed. If primed areas are to be left overnight, these areas shall be re-primed before wrapping.

Tape Wrapping:

The joint shall be spirally wrapped (minimum 55% overlap) with “Denso Acrylic Tape” (or approved equivalent) in accordance with the manufacturer’s requirements such that the start and end points are located at buried sections of the pipe, before it daylights. A 100% overlap is required on the first and last revolutions of the tape wrapping operation. It is important that tension in the tape be released when the wrapping of the last half circumference of the pipe.

Final Coating:

One coat of “Densoflex Fire Retardant” shall be applied to the exposed pipe at a nominal application rate of 3 m² per litre.

PSL 3.9.4 Flexible Couplings

Delete the sub-clause and substitute:

All flexible ("Viking Johnson" or "Klamflex" type) couplings shall be lined and coated with epoxy as specified in Sub-Clause 3.9.2.2(b)(1) and PSL 3.8.2.1.

PSL 3.9.5 Jointing Material

Bolts and nuts shall conform to SANS1700-8-2 or SABS 135. All bolts, nuts and washers shall be electro-galvanised.

Gaskets shall be full-faced gaskets made of rubber materials.

PSL 3.9.6 Corrosion Protection to Couplings, Joints and Flanges

Add to Sub-Clause:

Each steel or cast-iron coupling, joint or flange and valve, where scheduled, shall be protected by application of a primer such as "Densotherm Primer" (or similar approved), as dictated by the material characteristics, and coated using 2,0 mm thick "Densotherm" (or similar approved) bituminous tape applied with a 55% overlap, all in strict compliance with the manufacturer's directions and instructions. In the case of couplings and joints a shrink-wrapped envelope shall then be applied around the entire wrapped coupling or joint for mechanical protection.

PSL 3.9.7 Corrosion Protection to Branches, Air Valves and Tees (New Sub-Clause)

Where they are to be backfilled, branches, scour and air valve tees and crotch plates shall be coated using an epoxy coating (Copon KSIR88 or similar approved) having a minimum dry film thickness of 250µm, which shall be applied strictly in accordance with the manufacturer's requirements. After the epoxy coating has been fully cured, the whole of the fitting shall be primed with "Densotherm Primer" (or similar approved) and coated using 2,0 mm thick "Densotherm" (or similar approved) bituminous tape applied with a 55% overlap, all in strict compliance with the manufacturer's directions and instructions.

Exposed specials in chambers including valves, flanges, crotch plates, flexible couplings etc, shall be protected externally by the application of Copon "KSIR88” or equivalent approved epoxy coating to a minimum dry film thickness of 300 microns. Each coat shall not exceed the maximum thickness specified by the manufacturer. Surface preparation and application shall be strictly in accordance with the manufacturer's instructions.

Alternatively, a suitable solvent free epoxy coating may be applied, in which case the required dry film thickness of a minimum of 300 micrometres may be achieved in one application.

PSL 3.10 Valves

Delete the Sub-Clause and substitute:

Valves supplied under this Contract shall comply with the requirements of Particular Specification PA.

PSL 3.10(a) Item Numbers

Item numbers which appear in the Bill of Quantities for all valves, steel and cast-iron pipes shall be painted on each valve, pipe, special and fitting in 75mm high lettering except where the size of the item dictates the use of smaller lettering,

PSL 3.11 Manholes and Surface Boxes

PSL 3.11.1 Bricks

Delete the first sentence and substitute:

Bricks for manholes and surface boxes shall be engineering bricks type FBXE45 or better, with a water absorption not exceeding 7% and complying with the applicable requirements of SABS 227.

PSL 3.11.5 Manhole Covers and Frames

Delete the sub-clause and substitute:

Covers and frames for manholes shall be of polymer concrete construction and shall comply with the requirements of SANS1882/2003 for Type 2B in the case of manholes in roads and other areas subject to road traffic loads, and Type 4 in the case of manholes not subject to such loads. Covers and frames shall be supplied in matching sets. The Contractor shall ensure that, when installed, the covers and frames still comply with the requirements of SANS1882/2003 for freedom from warp and evenness of seating.

PSL 3.11.6 Surface Boxes

Delete the sub-clause and substitute:

Surface boxes shall be of polymer concrete construction and shall comply with the requirements of SANS1882/2003 for Type 3A in the case of surface boxes for gate and scour valves, and for type 5 in the case of surface boxes for hydrants and air valves.

PSL 3.11.7 Sand (New Sub-Clause)

Sand used for mortar (general purpose and for plaster (external) shall comply with the applicable requirements of SANS 1090.

PSL 3.11.8 Cement (New Sub-Clause)

The cement used on the Works shall be Ordinary Portland Cement complying with the requirements of SABS 471 (or the equivalent in accordance with SABS ENV 197-1).

PSL 4 PLANT

PSL 4.1 Handling and Rigging

Add to Sub-Clause:

Pipes of length exceeding 6m shall be moved with the use of padded slings of width sufficient to prevent damage to the coating. Chain slings, hooks, wire ropes, rope slings without canvas covers, composition belt slings with protruding rivets and any other equipment liable to damage the coating shall not be used. All pipes are to be lifted with the aid of a "spreader" lifting beam and special care is to be taken to ensure that no damages occur to the pipe coatings by preventing the pipes from sliding on or hitting adjacent pipes. Lifting centres shall be not more than 6 m apart.

To ensure that coated pipes do not bear against each other while being transported, either plastic or fibre bags containing resilient material that shall not disintegrate or deteriorate when exposed to the elements for prolonged periods shall be used. The padded bags shall have a minimum width of 500 mm and a minimum length of one and a half times the diameter of the pipe to be supported, or 500 mm - whichever is the greater. All ropes used for fastening shall be so padded as to prevent damage to the coating.

Padded bags shall also be used in the stacking of the pipes at the pipe yard on delivery, and the contractor shall provide sufficient bags so that the pipes can be stacked a minimum of 300 mm clear of the ground and do not touch each other. Stacked pipes shall have a minimum clearance of 50 mm between adjacent pipe walls.

PSL 4.4 Packing (New Sub-Clause)

Goods should be suitably packed in such manner as will ensure safe and efficient transport by road or rail, and the Contractor shall include in his prices for whatever packing may be necessary in this respect. Small items particularly liable to damage or loss in transit should be crated. All crates and packing material shall, after use, become the property of the Employer, unless distinctly specified otherwise, or if returnable, shall be so at the Contractor's expense.

PSL 4.5 Advice Notes and Invoices (New Sub-Clause)

The Contractor shall submit one copy of every advice note in respect of each individual consignment, quoting the Contract Number, the truck or vehicle number, item numbers and a brief description of the articles so consigned. The advice note shall be lodged with the Engineer's Representative on Site at least two days before the arrival of the goods.

PSL 4.6 Delivery and Acceptance (New Sub-Clause)

The material to be supplied under this Contract shall be consigned and delivered to approved areas adjacent to the pipeline route, or to an approved and prepared storage area if not required for immediate use.

PSL 5 CONSTRUCTION

PSL 5.1 Laying

PSL 5.1.1 General

Add to the Sub-Clause :

The Contractor will be responsible for clearing the areas required for pipe storage that shall include the removal of rock, stones and all combustible material. He shall also be responsible for maintaining the area in a clean and tidy condition and securing the site for the duration of the Contract. No separate payment will be made for this operation.

Upon delivery of the pipes, fittings, specials and valves, these will be inspected jointly by the Engineer's Representative and the Contractor. Any material found to be damaged shall be returned to the factory for repair or replacement; in which case the costs of additional transport, repair or replacement shall be borne by the Contractor.

The Contractor will be held fully responsible for the care and safety of all pipes and fittings, etc, on site, and shall bear the cost of all renewals, which may be necessary to make good losses, damages or breakages. Furthermore, he shall be fully responsible for handling and re-loading material at the storage areas and for transporting and offloading of all such materials at their correct places along the pipeline route.

PSL 5.1.1.1 Distribution of Material (New Sub-Clause)

Before commencing pipelaying, the Contractor shall properly distribute pipes, fittings and specials, along the trenches. Valves and couplings shall not be distributed until they are actually required for laying in their designed position.

PSL 5.1.1.2 Prevention of Fire Damage to Pipes (New Sub-Clause)

The Contractor shall be responsible for protecting pipes etc from grass and bush fires at all times. He shall keep grass cut short in the vicinity of all unlaid pipework items.

PSL 5.1.1.3 Pipelaying Personnel (New Sub-Clause)

The laying of all pipework items shall be performed only by qualified and experienced persons or who are registered as artisans in the plumbing, pipefitting or drainlaying trades or who are qualified by reason of having attended and passed the course on pipelaying of the Civil Engineering Industry Training Board.

PSL 5.1.1.4 Inundation of Pipe Trenches and Floating of Pipes (New Sub-Clause)

Should trenches be inundated by water, there is a risk of movement of the pipes by flotation. The Contractor shall ensure that trenches are not flooded by stormwater and that pipes laid in the trench are backfilled as soon as possible after laying, except at joints made with couplings or flanges which must be kept visible until the pipeline has been satisfactorily tested. Steel pipes with welded joints may, after all specified testing and corrosion protection has been satisfactorily completed and with prior approval from the Engineer, be backfilled at the same time as backfilling the pipeline.

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Should movement of the pipes occur, the Contractor shall remove the pipes from the trench and thoroughly clean and relay the pipes. This work shall be carried out at the Contractor's expense.

PSL 5.1.3 Keeping Pipelines Clean

Add to the sub-clause:
The Contractor shall take all of the steps necessary to prevent flooding of the Works and hence ensure that all work is carried out in the dry, and that the ingress of dirt and or dirty water into the pipes is prevented.

PSL 5.1.3.1 Cleaning Pipe Internals (New Sub-Clause)

The Contractor shall ensure that all pipe work is installed internally free of any contaminants. All traces of dirty water, swarf, cuttings, coupons, grinding dust, dirt and other debris are to be removed from the inside of the pipe as it is installed.

The Contractor shall ensure that all dust, grit and powder that accumulates in the pipe as a result of grit blasting for the repair of internal linings, be removed from the pipe in an acceptable manner before the internal lining repairs are carried out.

The Contractor shall take note that flushing of the completed pipeline may not be allowed after construction has been completed and therefore clean house keeping practices will be required under all circumstances during construction. The tendered rates for pipe laying shall include for the clean house keeping practices required.

Each section of the pipeline is to be internally inspected and passed by the Engineer once construction has been completed. If the pipework is not satisfactory, the Contractor shall re clean the pipe at his own expense until the pipe is passed clean. The Engineer reserves the right to utilize cameras or any other means to inspect inaccessible areas.

PSL 5.1.3.2 Cleaning of Valves and Fittings (New Sub-Clause)

All flanges, valves, fittings and equipment are to be installed in pipe work only after they have been thoroughly cleaned. Flange faces shall be checked for damage before being incorporated into the permanent works and any damage shall be reported to the Engineer.

PSL 5.1.4 Depths and Cover

Delete Sub-Clause 5.1.4.1 and substitute the following:

Unless otherwise shown on the drawings or scheduled in the Bill of Quantities or ordered, the depth of excavation for trenches for medium-pressure pipelines shall not exceed 1,2 m.

PSL 5.1.5 Marker Posts (New sub-Clause)

Pre-cast concrete marker posts as shown on the drawings and painted white in colour shall be set at all horizontal direction changes and where otherwise indicated by the Engineer.

The standard marker post rate shall include the supply and erection of painted, inscribed posts. The rate shall be inclusive of erection and shall include for all necessary excavation, mass concrete footing and formwork.

PSL 5.2 Jointing Methods

PSL 5.2.2 Flanges (Steel Pipelines)

Add to the Sub-Clause:

Before being brought together, the ends of the pipes, fittings, couplings and all flanges are to be inspected and cleaned to ensure that all parts forming the joint are undamaged and clean.

When jointing flanges, the faces shall be cleaned thoroughly and approved jointing material (rubber or similar approved), cut properly to size, is to be inserted immediately before bringing the two flanges together.
Before closing the joints, the flanges must be parallel to each other, with all bolts inserted in the bolt holes. After the fittings have thus been aligned and well supported, the joint shall be bolted up to a uniform tightness. Jointing material shall be flush with, or protrude beyond, the outer circumference of the flange. On completion of the joint, the flanges and bolts shall be protected as described in Clause PSL 3.9.6.

PSL 5.2.5 Flexible Coupling Joints (New Sub-Clause)

Where ordered, steel flexible couplings are to be of the "Viking Johnson"/"Klamflex" or similar approved type without central registers, each comprising one centre collar, two special flanges, two rubber rings and electro-galvanised mild steel bolts.

Adaptor couplings shall be of a similar design, but one end shall be flanged to enable connection of plain ended pipes to flanged specials.

Steel couplings shall be assembled strictly in accordance with the manufacturer's instructions. Where the coupling has no internal register a 6 mm joint gap shall be central within the coupling. On completion of testing and continuity bonding, the entire joint shall be protected as described in Clause PSL 3.9.6.

The tendered prices for laying and jointing are to include for the supply of all necessary materials, plant and labour to complete the joint.

PSL 5.2.6 Cut Pipes (New Sub-Clause)

Cut Pipes may be used where required as closure lengths. The cut ends shall be dressed square and to a smooth even finish which shall not be inferior to that of the ends of uncut pipes. Cold rolling of grooves to specification according to SANS 815-2 shall be allowed for grooved end pipe. The finished dimensions of ends cut at Site must be within the tolerances applicable to the ends of the particular types of pipe to be laid. The cost of cutting and trimming of pipes shall be included in the rates tendered for laying and jointing pipes.

The corrosive protection shall be repaired on any cut pipe end as per approved Method Statement.

PSL 5.3 Setting Valves, Specials and Fittings

Add to the Sub-Clause:

Valves are to be set correctly in the positions indicated and supported on concrete stools, unless otherwise directed by the Engineer. Valve spindle guide brackets and stays where provided

shall be secured into position against concrete work and these must be set and carefully adjusted in order to give true vertical alignment of the spindle.

PSL 5.4 Concrete Casing

In the first and second lines delete "a strength 15 MPa/37,5 mm or such other strength as scheduled" and substitute "concrete grade 20/19".

PSL 5.5 Anchor/Thrust Blocks and Pedestals

In the fourth line delete "15 MPa/37,5 mm" and substitute "20/19"

PSL 5.6 Valve and Hydrant Chamber

PSL 5.6.2 Construction of Chambers

Delete the references to drawings L1, L2 and L3 and substitute “the tender drawings”

PSL 5.7 Manholes

PSL 5.7.2 Precast Manholes

Add to the Sub-Clauses:

Drawings showing details of the manholes are included with this tender document.

PSL 5.8 Brickwork in Chambers and Manholes

Delete the eleventh line and substitute the following:

Mortar for brickwork and plasterwork shall be composed of one part of cement to four parts of sand.

Twelfth and thirteenth lines to be deleted.

Add to the Sub-Clause:

Plaster is to be applied in one coat not less than 12 mm in thickness.

PSL 5.10 Disinfection of Potable Water Pipelines

Delete the clause and replace with:

The Contractor will be required to submit a detailed method statement for approval by the Engineer. Refer Particular Specification PC: Disinfection of Pipeline.

Once a successful hydraulic test of the entire pipeline has been achieved and the connections have been completed, the pipeline shall be drained. The pipeline shall then be re-charged in accordance with PSL 7.3.4 – “Initial Filling of the Pipeline”. The disinfection of pipelines will require the use of potable water.

The entire pipeline disinfection will be monitored by the Engineer’s Representative. The disinfection criteria are stringent and the Contractor shall keep the pipeline clean throughout the Contract.

A minimum requirement will be that the method statement deals with the method of dosing and how the dosing rate will be controlled to ensure a uniform distribution throughout the pipeline being disinfected, the chemicals to be used, the anticipated range of dosing rates and equipment to be used, and the name and qualification the Contractor's person supervising the disinfection.

Once satisfactory disinfection has been achieved, the pipeline shall be drained via the scour valves (or by other means approved by the Engineer) and sufficient sodium thiosulphate

(typically 1 part of total chlorine) shall be dosed into the scour-wet wells to fully neutralise the chlorine before discharging to watercourse.

The pipeline shall then be re-charged with potable water in accordance with the stated procedure and, after 24 hours, samples will be taken for analysis (at no cost to the Contractor). Should a zero level of E. Coli and Total Coliforms not be achieved, the Contractor shall carry out at his/her own cost, all steps deemed necessary by the Engineer to achieve satisfactory disinfection.

The price for testing and disinfecting pipelines and fittings is included in the scheduled items for supply and installation.

PSL 6 TOLERANCES

PSL 6.2 Control Points

In the third line delete "± 100 mm" and substitute:

"± 50 mm provided that there shall be no reversal of gradients and provided that, in those areas where gradients shown on the drawings is less than 1%, the permissible deviation will be ± 25 mm".

PSL 6.3 Alignment (Plan and Level)

In the third line delete "± 100 mm or ± 20%" and substitute "± 50 mm or ± 10%".

In the fourth line delete "± 20 mm" and substitute "± 10 mm".

In the sixth line delete "± 50 mm or ± 10%" and substitute "± 25 mm or ± 5%"

PSL 7 TESTING

PSL 7.3.1 Test Pressure and Time of Test

Delete second line of Sub-Clause 7.3.1.1 and substitute the following:

attained the strength specified in terms of Sub-Clause 5.5.

PSL 7.3.1.2 Delete this Sub-Clause

PSL 7.3.1.3 Delete the Sub-Clause and substitute the following:

Each pipeline shall be subjected to a field test pressure as shown on the drawings or as specified by the Engineer.

Generally, the field test pressure applied to any section of the pipeline under test, taking differences in elevation along the pipeline into account, shall be such that the pressure at any point along the section under test shall not exceed the appropriate of the values set out in Sub-clause 7.3.1.4 and that the minimum pressure shall be not less than the design (working) pressure.

The sections in which the pipeline may be tested will be at the discretion of the Contractor, except that the pipeline shall not be tested in sections exceeding a maximum allowable length of 1 000 m unless otherwise agreed by the Engineer and also taking cognisance of the requirements of Clause C3.5.11 of the project specification.

At all times when there is water in the pipeline, and particularly during filling, testing and draining of the pipeline, all air valves shall be in operation and their individual isolating valves shall be open.

PSL 7.3.3 Permissible Leakage Rates (Sub-Clause 7.3.3)

Delete the title of Sub-Clause and substitute the following

Permissible Make-up Water

Delete the sixth line and substitute the following:

(a) Fibre cement and concrete pipes and concrete-lined steel pipes:

PSL 7.3.4 Initial Filling of the Pipeline (New Sub-Clause)

Add new Sub-clause:

The Contractor shall devise a suitable plan for filling of pipelines so as to exclude excess air. The Contractor should consider, as part of a successful plan, to limit the length of pipeline to be filled at one time, filling the pipelines from the lowest point and providing a vent(s) at high point(s) for the escape of air. The rate of filling of water should be limited to not more than 0,3 m/s effective velocity in order to prevent trapping of air.

PSL 7.3.5 Connections After Testing (New Sub-Clause)

The connections of the new pipework to the existing pipework shall only be carried out after the pipeline testing has been completed and accepted by the Engineer. For this reason, testing must be carried out against a blank flange or bullnose end cap at these locations.

PSL 7.3.6 Remedial Measures (New Sub-Clause)

In the event that a pipe section fails a test, the Contractor shall carry out all remedial measures necessary to obtain a successful test of each individual section and the entire pipeline, at his/her own expense. Such remedial measures shall in no way compromise the original pipeline specifications.

PSL 7.3.7 Draining of the Pipeline (New Sub-Clause)

The pipeline may have to be drained to carry out remedial measures and it must be drained before the disinfection process commences. The pipeline shall be drained via the scour valves in a manner that does not cause erosion of the streambeds or negatively impact on the environment in any way. All such drainage of the pipeline shall be carried out under the supervision of the Engineer.

PSL 8 MEASUREMENT AND PAYMENT

PSL 8.2.1 Supply, Handle, Lay, Joint, Bed, Test and Disinfect Pipes Complete with Couplings

Delete the sub-clause and substitute:
"Supply, handle, lay, joint, bed, test and disinfect pipes, bends, specials, fittings and valves complete. Unit : m or No

Pipes, bends, specials, fittings, valves, etc will be measured per metre or by number as scheduled.

The rates shall cover the cost of the provision of the pipes or bends or fittings, or valves or specials as scheduled complete with couplings or sleeves if applicable, coating and lining, handling, inspecting, marking fittings and specials with item numbers, transporting, handling, detection testing for steel pipes, forming joint holes in all materials, bedding, laying, welding, jointing, cutting, all testing and disinfecting and where relevant all welding and the completion of the internal and external corrosion protection (make good) and jointing materials (e.g. nuts, bolts, washers, gaskets, welding rods etc).

A maximum payment of 85 % of the tendered rate may be made for the completed section of pipeline which has not yet been hydraulically pressure tested and disinfected. A further payment of 10% of the tendered rate will be made upon successful completion of the pressure testing for the relevant section of pipeline. The final 5% of the tendered rate will be made upon completion of disinfection of the pipeline."

PSL 8.2.11 Anchor/Thrust Blocks and Pedestals

Delete the last line and substitute the following:

formwork, concrete, reinforcement (if any), and screeding to top surfaces.

PSL 8.2.12 Concrete Encasing at Stream Crossing

Add the following to L8.2.12:

The rate tendered for concrete shall include for the provision of additional excavations, formwork, reinforcement (if any), trimming and finishing of the concrete encasing.

PSL 8.2.15 Special Wrapping in Corrosive Soil

Delete the Sub-Clause and substitute the following:

Payment for corrosion protection of joints shall cover the cost of the provision and fixing of the sheathing/wrapping in accordance with the relevant specification and the cost of any delay and inconvenience caused by the requirement to sheathe/wrap. Separate items will be scheduled for each type and size of joint to be protected Unit : No

Payment for corrosion protection of valves shall cover the cost of the provision and fixing of the sheathing/wrapping in accordance with the relevant specification and the cost of any delay and inconvenience caused by the requirement to sheathe/wrap. Separate items will be scheduled for each type and size of valve to be protected, and the rate shall include for protection of the whole of the valve body, all flanges integral to the valve, the connecting flanges to the valve (i.e. including the two flanges of the pipework connected to either side of the valve) and the packing of mastic (without tape or sheathing) over the gland adjusting bolts and nuts Unit : No

PSL 8.2.16 Cut Pipes (New Sub-Clause)

Extra over for cutting of pipe Unit : No

The rate shall cover the cost of the cutting of the pipe and all making good of lining and coating, welding, testing and forming joint holes in all materials.

PSL 8.2.17 Connecting to Existing Pipeline (New Sub-Clause)

Connecting to existing pipeline Unit : Sum

The rates for connecting to existing pipelines and proposed flanged connections shall cover the cost of exposing the existing pipeline (or blank flange), cleaning and preparing the pipe for cutting, cutting and preparing the pipe ends for jointing, jointing (or removing the existing blank flange and connecting the new pipework), testing and recommissioning the pipeline including all bedding and backfilling and making arrangements with the Employer's staff to temporarily shut off the existing pipeline whilst effecting the connection(s).

PSL 8.2.18 Pipeline Markers (New clause)

The rate shall cover the cost of supplying the markers and for the installation as shown on the drawings. Unit: No

PSL 9 DRAWINGS L-1, L-2 AND L-3

PSL 9.1 References to mortar mixes to read:

1 to 4 mortar

C3.7.9 PSLB: BEDDING (PIPES) (Applicable to SABS 1200 LB - 1983)

PSLB 2.3 DEFINITIONS

Main fill:

Delete "150mm" in second line and substitute "300mm".

PSLB 3 MATERIALS

PSLB 3.1 Selected Granular Material

Delete the sub-Clause and substitute:

Selected granular material shall be a granular material with a PI not exceeding 6, grading modulus not less than 1,2, free from lumps or stones retained on a 10 mm sieve and having a compactibility factor (as determined by the test given in Section LB of Part 3 of SANS 0120) not exceeding 0,4.

PSLB 3.2 Selected Fill Material

In the first line delete "PI not exceeding 6" and substitute "PI not exceeding 10".

In the second line delete "30mm" and substitute " 20mm".

PSLB 3.3 Bedding

The pipes to be laid under this contract are to be considered as ‘flexible’ for the purpose of bedding.

PSLB 3.4 Selection

PSLB 3.4.1 Suitable Material available from Trench Excavation

Add to the Sub-Clause:

If, in the opinion of the Engineer bedding material can be produced from the excavated material and if ordered by the Engineer, the Contractor shall screen the excavated material in order to produce material suitable for bedding. (see also PSLB 8.2.1).

PSLB 5 CONSTRUCTION

PSLB 5.1.2 Details of Bedding

Add to the Sub-Clause:

The pipelines are to be laid on the class of bedding indicated in the Bills of Quantities and/or on the drawings.

PSLB 5.1.4 Compacting

Delete the second line and substitute:

top of the pipeline) shall be 93% modified AASHTO.

Add to Sub-Clause 5.1.4:

No heavy compaction equipment will be permitted for compaction of any pipe bedding, only pneumatic or hand rammers being acceptable. To this end, and to achieve the 100% compaction specified it is recommended that bedding be brought up evenly on either side of the pipe. The use of complete saturation of the material as a method of achieving the specified compaction may, subject to the Engineer's approval, be used. However, in this

regard, contractors are advised that the presence of excessive quantities of water in the pipe trench could lead to flotation of the pipe.

Prior to the commencement of pipelaying the Contractor will be required to submit, to the Engineer, for his approval, a Method Statement detailing his proposed methods of placing, and compacting methods which he proposes to implement in order to ensure compliance with the specification.

PSLB 5.1.5 Testing (New Sub-Clause)

Flexible joints shall be left exposed with a minimum of 100mm clearance around the bottom of the pipe during hydraulic pressure testing of the pipe to facilitate inspection.

PSLB 5.2 Placing and Compacting of Rigid Pipes

PSLB 5.2.2 Class 'C' Bedding

Delete the third, fourth and portion of the fifth lines and substitute the following:

The pipes shall be bedded on a layer of compacted granular bedding material on which a 25mm thick layer of uncompacted granular bedding material has been placed and spread. Loose granular bedding material lying next to the pipe shall be placed into the haunch area and compacted with suitable hand tools, and additional selected granular material shall be added and compacted in layers until levels for the bedding cradle as shown on Dwg LB - 1 (c) are reached. The remainder of the bedding i.e. the selected fill blanket, shall be placed in layers up the sides of the pipe, each layer being compacted until levels are reached as shown on Dwg LB-1 (c).

PSLB 5.2.5 Stone Bedding (New Sub-Clause)

In areas where waterlogged conditions exist or where ordered by the Engineer, special drains consisting of a 150mm thickness (See PSDB 5.5) of single sized stone with a geofabric filter surround ("Bidim" Grade A4 or similar approved) extending the full width of the trench shall be provided below the bedding to the pipes. The excavation for these drains will be measured in cubic metres at the contract rate applying to unsuitable excavation below the bottom of the trench. The stone filling will be paid for per cubic metre and the geofabric filter will be paid for per square metre. All measurements in this connection will be to a width equal to the base widths and depths ordered.

PSLB 5.3(b) Selected Fill Blanket

Delete "200mm" from title.

PSLB5.4 Concrete Casing to Pipes

Add to the Sub-Clause:

Where concrete casing is ordered by the Engineer it is to be of grade 20/19 concrete with a minimum thickness of 150 mm above the top of the pipe.

PSLB 6 TOLERANCES

PSLB 6.1 Moisture Content and Density

Add to the Sub-Clause:

The permissible deviations applicable are to be those for Degree of Accuracy II class of work.

PSLB 8 MEASUREMENT AND PAYMENT

PSLB 8.1.3 Volume of Bedding Materials

Add to the Sub-Clause:

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

PSLB 8.1.6 Freehaul

Delete the Sub-Clause and substitute the following:

All haul will be regarded as free haul. No overhaul will be paid for under this Contract.

PSLB 8.2.1 Provision of Bedding from Trench Excavation

Delete the Sub-Clause and substitute the following:

1) Without the need for screening:

(a) Selected granular material.....Unit : m^3
(b) Selected fill material.....Unit : m^3

The rates shall cover the cost of acquiring, from any point along the trench excavation, bedding that complies with the relevant requirements of the specification, of delivering it to points alongside the trench spaced to suit the Contractor's methods of working, of making good any backfill deficiency from points where backfill has been acquired, and of disposing of displaced material.

2) Including for screening:

(a) Selected granular material.....Unit : m^3
(b) Selected fill material.....Unit : m^3

The rates shall cover the cost of screening or otherwise treating excavated material, at any point along the trench excavation, in order to produce bedding that complies with the relevant specification, delivering it to points alongside the trench, spaced to suit the Contractor's methods of working, of making good any backfill deficiency there may be from points where screened backfill material has been acquired, and of disposing of displaced material.

NOTE: The rate for the supply and laying of pipelines covers the cost of handling the bedding material from alongside the trench, placing it under the pipeline, forming joint holes and completing the bedding around and over the pipeline.

PSLB 8.2.3 Concrete Bedding Cradle

Add the following paragraph to the Sub-Clause:

“All concrete bedding to pipes will require formwork. The rate for concrete bedding shall include for the supply, installation and stripping of all formwork.”

PSLB 8.2.4 Encasing of pipes in Concrete

Delete the fifth and sixth lines and substitute the following:

“encasing the pipe in concrete 150mm thick each side of the pipe and to 150mm above the crown of the pipe including the cost of formwork, (if any), etc. and the cost of formwork to form stopends on either side of collars, couplings, joints etc if instructed by the Engineer and substitute along the length of the pipeline as shown on the drawings or scheduled, or, if instructed by the Engineer, on either side of collars, couplings, joints, etc."

The rate for concrete encasing shall include for the supply, installation and stripping of all formwork.” Unit: m

PSLB 8.2.5 Overhaul of Material for Bedding Cradle and Selected Fill Blanket

Delete the sub-clause.

PSLB 8.2.6 Drainage Layer (New Sub-Clause)

Supply and place beneath pipe, 150mm crushed stone layer as ground water drainage layer. The excavation for these drains will be measured in cubic metres at the tendered rate applying to unsuitable excavation below the bottom of the trench (SABS 1200 DB 8.3.2 c).

The rate for stone filling shall be per cubic metre of stone fill, measured according to a width equal to the base widths and depths ordered. Unit: m^3

Supply and installation of geofabric filter material (BIDIM Grade A4 or similar) around stone. The rate shall be per square metre of geofabric to enclose the stone material, measured net according to a width equal to the base widths and depths ordered. Unit: m^2

PSLB 8.2.7 Royalty Payment for Borrow pit

A Provisional Sum has been provided for the compensation of landowners for the procurement of selected bedding and blanket material from existing borrow pits and/or sand source. Unit: Prov Sum