



CONTRACT NO: 2024/035

CONTRACT TITLE:

UPGRADE OF NSEZI RAW WATER TRANSFER SYSTEM
CONSTRUCTION OF 4.5KM OF DN1500 CONTINUOUSLY WELDED STEEL PIPELINE

VOLUME 3 – Scope of Works, Specifications, Site Information and Annexures

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TABLE OF CONTENTS

<u>DESCRIPTION</u>	<u>PAGE</u>	<u>SHEET COLOUR</u>
VOLUME 1		
THE TENDER		
T1 TENDERING PROCEDURES		
T1.1 Tender Notice and Invitation to Tender	T1.1	White
T1.2 Tender Data	T1.3	Pink
T.2 RETURNABLE DOCUMENTS		
T2.1 List of Returnable Documents.....	T2.1	Yellow
T2.2 Returnable Schedules and Documents	T2.3	Yellow
VOLUME 2		
CONTRACT		
C.1 AGREEMENTS AND CONTRACT DATA		
C1.1 Form of Offer and Acceptance.....	C1.2	Yellow
C1.2 Contract Data.....	C1.7	Yellow
C1.3 Form of Guarantee.....	C1.17	Yellow
C1.4 Adjudicator's Agreement.....	C1.18	White
C1.5 Agreement in terms of OHS Act No. 85 of 1993.....	C1.20	White
C.2 PRICING DATA		
C2.1 Pricing Instructions.....	C2.1	Yellow
C2.2 Bill of Quantities	C2.4	Yellow
VOLUME 3 – THIS DOCUMENT		
C.3 SCOPE OF WORK		
C3.1 Description of Works.....	C3.1	White
C3.2 Employers Agenting.....	C3.8	White
C3.3 Procurement.....	C3.9	White
C3.4 Construction	C3.11	White
C3.5 Management of the Works	C3.17	White
C3.6 Specification Data	C3.41	White
C.4 SITE INFORMATION		
C4.1 Locality Plan.....	C3.198	Green
C.5 PARTICULAR SPECIFICATIONS		
C5.1 General Specifications	C3.200	White
C5.2 Particular Specifications	C3.206	White



C.6 Drawings

C6.1	Drawings	C3.240	White
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C.7 Annexures (Attached on USB)

C7.1	Project Specific Particular Specifications	C3.242	White
C7.2	Other Documents	C3.244	White

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PART C3

SCOPE OF WORKS

C 3.1 Description of the Works

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C3.1.1 Employer's Objectives

Umgani-Uthukela Water is a state-owned business enterprise that operates within the South African legislative parameters. The primary purpose of the Nsezi Water Treatment Plant is to provide high quality water for the manufacture of paper and to supply various local authorities with potable water for domestic and industrial use. The plant also supplies clarified water to Mhlathuze Municipality for industrial use by Foskor for the manufacturing of phosphoric acid and Fertilizer.

The primary raw water source for the Nsezi Water Treatment Plant is from the "Weir Pump Station" weir located on the Mhlathuze River with water released from the Goedertrouw Dam (Lake Phobane). The WTP has an alternate supply from the "Lake Pump Station" adjacent to Lake Nsezi. Mhlathuze Water is in the process of augmenting the Nsezi WTP for increased yield. This contract will focus on the upgrade of the existing raw water conveyance system.

The Employers objectives are summarised as follows:

- Upgrade the raw water supply system from Mhlathuze Weir to the Nsezi Water Treatment Plant to align with Mhlathuze Water's contractual obligations and low risk profile. It is noted that the Nsezi Lake Pump Station has a raw water capacity of approximately 205MI/day with no redundancy.
- The anticipated work is to be completed within the stated time for completion.
- The Water Treatment Works is to be upgraded/augmented to suit the operational requirements under a separate contract.

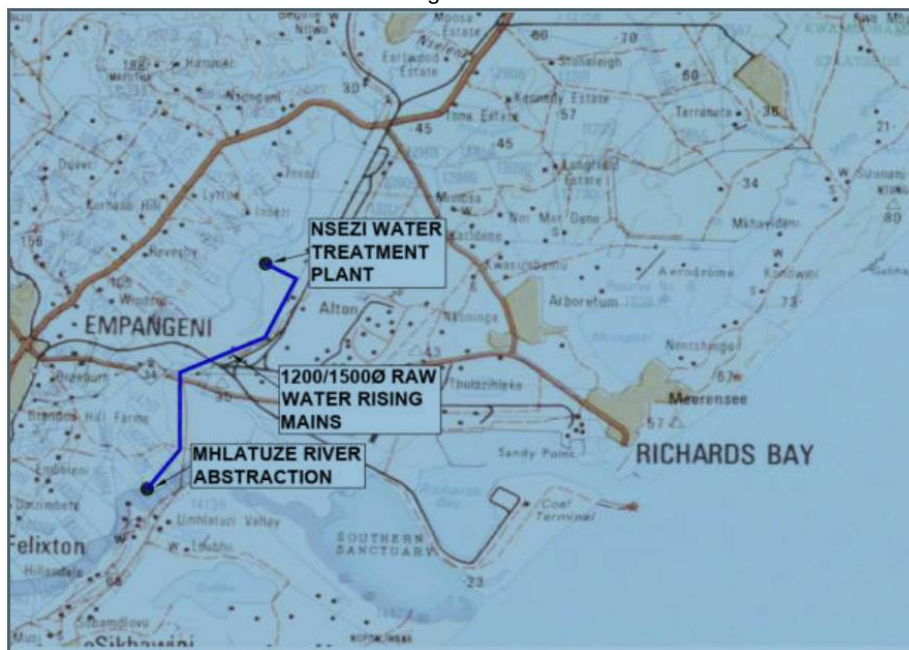
C3.1.2 Overview and extent of the Works

C 3.1.2.1 General

The current raw water transfer system from the Mhlathuze River to the Nsezi Water Treatment Plant comprises of the Mhlathuze river weir pump station and existing pipelines. The replacement of the existing DN1200 steel rising main is required to increase the pumping capacity of the system.

Approximately 4.5km of DN1500 continuously welded steel pipeline is to be constructed alongside the existing DN1200 rising main. The construction of the DN1500 pipeline traverse's sensitive grassland along portions of the pipeline servitude. This includes the tie in into the existing DN1500 at the shooting range.

The general extent of the site for the construction of the Works under this contract is shown as follows:



C 3.1.2.2 Mhlathuze River Abstraction

Mhlathuze Weir:

The weir was constructed during 1984 but rebuilt to modified design after the 2008 flood damage caused by Domoina, with modifications over the years. The work under this contract does not affect the existing weir.

C3.1.2.3 DN1500 steel rising main

A DN1500 continuously welded steel rising main approximately 4.5km in length is to be constructed from the Shooting Range to the Nsezi intake tower. The DN1500 pipeline to be constructed needs to be tied into the existing DN1500 pipeline at the shooting range. A new cross connection chamber will be constructed for the tie-in. Termination conditions of the DN1500 pipeline to be constructed is shown on the drawings but attention is drawn to the battery limits under this contract and the coordination required with works at the Nsezi WTP with other contracts dealing with the Water Treatment Plant upgrade. The newly constructed DN1500 pipeline will terminate with a connection to existing pipework at the Nsezi Water Treatment Plant intake tower.

The DN1500 pipeline to be constructed between the Shooting Range and the Nsezi WTP follows the existing DN1200 rising main route and needs to remain within the proposed pipeline servitude.

The following reflects the general characteristics of the pipeline:

- A multitude of services exists in the vicinity of the proposed DN1500 pipeline, especially at the approach to the WTW and inside the WTW site. These are to be proved and protected at all times.
- The Contractor is to ensure extensive shoring is provided for at the existing chambers, pipelines and along the existing pipeline route.
- Extensive dewatering is required along the pipeline route.
- All existing access roads utilised by the existing residents/public are to be maintained and provided access across/adjacent to pipeline in these locations.

Pipe General:

- Length – approximately 4.5 km.
- Size – DN1500.
- Grade of Steel – X42 to API 5L with yield strength of 289 MPa.
- Wall thickness – 12mm.
- Coating (In Accordance with UW Particular Spec), the Contractor is to ensure the rates for coating repairs/reinstatement are to cater for all 3 coating systems:
 - Pipe Coating System 1: Solvent Free Polyurethane Coating, OR
 - Pipe Coating System 2: Fusion-Bonded Medium Density Polyethylene Coating
 - Pipe Coating System 3: Three Layer System
- Solvent Free Liquid-epoxy has been selected as the preferred steel pipeline lining. The lining is to be applied in accordance with ANSI/AWWA C210-97 'Liquid-epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines'. The pipes shall be lined to a dry film thickness of a minimum of 400 µm and a maximum of 1000 µm and shall be free from sags and runs.
- For practical purposes the steel pipeline to be constructed is not a slender pipe, but special care is to be taken with bedding preparation and placement.
- Tie ins are required at the shooting range junction and into the WTW system.

Pipeline servitude:

The land on which the pipeline is to be constructed belongs to Mhlathuze Municipality, Transnet and Eskom.

The proposed DN1500 and all finally constructed infrastructure should be constructed as per the pipeline route.

Working space will be made available. A 10m wide restricted working corridor is allowed for construction. The Contractor is to take note of restrictions in working corridor widths. In addition to this, steep slopes at existing wash away points (to be located and verified by Contractor on site) require special attention with a reduction in working corridor width.

Protection of the existing pipelines

The existing pipelines with ancillary structures in close proximity to the DN1500 pipeline needs to be protected at all times during construction.

General work items:

- Tie ins of the newly constructed main to existing pipework is required.
- Undertake the required earthworks for the pipeline construction and adequately spoil surplus material.
- Bedding material may be obtained from trench excavations and sieved to comply with the specification, alternatively bedding will be imported from commercial sources where insitu material is deemed to be unsuitable.
- Road crossings and water course crossings of the pipeline requires concrete encasement of the pipeline.
- Construction of scour valve assemblies with chambers.
- Construction of air-vacuum relief systems with accommodating chambers.
- Indications on site are that extensive shoring will be required along both trench side walls and chambers to prevent collapse of trench side walls.

Page C3.5

- Stormwater diversion berms are to be constructed in accordance the environmental specialists specifications (EMP & EMPr) to prevent future erosion.
- Pipeline testing to be under taken according to SANS 2001:DP2.
- Water course crossings are to be undertaken as specified in the drawings.
- Rehabilitation of the working corridor is required.
- Work under restricted conditions in environmentally sensitive areas will be required.
- Proving of existing services is required.
- Protection of existing services is required.
- Planning and communication/ approval of all shutdowns with Mhlathuze Water personnel.
- Construction of reinforced concrete chambers.
- Commissioning of the systems/components of the Works in all respects.
- Reconstruction and/or the reinstatement of roads as a result of damage caused by pipe laying activities. This could include upgrading at specific locations as instructed by the Employer's Agent.
- Relocation of services for the purpose of the construction of the pipeline.
- Stabilisation of embankments by utilising various different technical techniques.
- Progressive reinstatement of the ground surfaces and vegetation as the construction fronts progress along the route of this contract or reinstatement of vegetation in sections at a seasonably appropriate time.
- Construction of gabions and other earth retaining structures to retain earth embankments.
- Stream crossings and rehabilitation of wetlands.
- Cathodic protection of all steel pipelines.
- Construction of valve chambers and scour valves with internal mechanical installations.
- Flotation of the pipelines to be prevented, where constructed takes place in areas of highwater table or due to heavy rainfall.
- Where high water tables are present the management of infiltration of water into excavations will be required.
- Topsoiling and grassing.
- Environmental Rehabilitation.
- Tie ins to be co-ordinated between Contract 3-1 and Contract 3-2. The Contractor will be responsible for this co-ordination.

Pipe Yard & Supply of Pipe:

The pipe required for the construction of the DN1500 pipeline is stacked in the pipe yard which is located at the Nsezi Water Treatment Plant. The additional pipe to be procured under this contract can be stored within the Nsezi WTP as per the Employers Agent's instruction.

Specific requirements are applicable to the withdrawal of the pipe from the pipe yard. These are stated under section C 3.4.5.

C 3.1.2.4 Environmental matters

The DN1500 pipeline route is located within the highly sensitive Kwambonambi Hygrophilous Grassland ecosystem. All work has to take pace in terms of the required EMPr for the project, with specific emphasis on limitation to vegetation clearance and collateral damage to the grassland.

The Environmental Management Plan is attached as an annexure. Compliance with the EMP and EMPr is required.

Environmental rehabilitation is to be undertaken by a selected subcontractor as referred by the Employer. A provisional sum has been allowed for in the Bill of Quantities under the Preliminary and General section for this purpose. In general, the following work is anticipated (but not limited to):

- Rescue activities
- Levelling of works areas.
- Installation of erosion control mechanisms.
- Spreading of topsoil.
- Scarifying of compacted areas where required.
- Sowing of seed to emulate existing vegetation conditions.
- The planting of trees and plants
- Relocation of trees/vegetation.

The Contractor shall bring on board the rehabilitation subcontractor at the onset of the construction of the Works in order to cater for rescue activities as soon as construction commences and final environmental rehabilitation during & at the end of the contract. The appointed specialist is to undertake an assessment of all environmental rehabilitation and prepare a Bill of Quantities for all work to be undertaken.

The site clearance activities shall take place under the supervision of the rehabilitation subcontractor in conjunction with the Employer's Environmental Officer in order to ensure coordination of rehabilitation work.

C3.1.2.5 Cathodic Protection

Cathodic protection of the DN1500 pipeline forms an integral part of the pipeline construction, especially in view of the fact that the pipeline runs parallel to and in close proximity to the Direct Current railway line, which includes a substation nearby. The cathodic protection installation will be done by a CP specialist, to be appointed and managed as a subcontractor under the main contract. A Provisional Sum is allowed for the CP work under this contract.

C 3.1.2.6 Compilation of Construction Dossier

The work to be executed under the Contract has to be supported by an approved Quality Assurance and Control system of the Contractor, resulting in a Construction Dossier to be compiled, containing ALL the quality records for the construction of the Works.

The Quality Control requirements for this Contract is addressed in the Particular Specifications.

The Contractor's attention is drawn to the Quality Assurance procedures required by the Employer. (Refer to the particular specification as attached)

C 3.1.2.7 Interaction with public relations consultants

Interaction and communication on progress with the Works relative to the programme for the construction of the Works will be required with the appointed ISD consultant of Mhlathuze Water in order to allow for the required community participation and information sharing.

C3.1.3 Location of the Works

The site is located between the Mhlathuze River Weir Abstraction Pumpstation situated at **28°48'03.50"S, 31°57'20.10"E** and the Nsezi Water Treatment Works situated at **28°44'54.60"S, 31°58'50.34"E** in the Richards Bay area, City of Mhlathuze, King Cetshwayo District.

C3.1.4 Temporary Works

The Contractor is responsible for all temporary works on site.

C3.1.5 Nature of ground and sub-soil conditions

A geotechnical investigation has been undertaken for this Contract. It shall be the Contractors responsibility in terms of the Conditions of Contract to have inspected the site and have satisfied himself, by his own independent enquiries and observations, as to the nature of the ground and subsoil conditions.

No claims for additional payment or an extension of time shall be considered on account of the existing site conditions and nature of the ground and subsoil.

Tenderers shall be permitted to make any trial pits or boreholes to carry out any sub-surface investigations of the area they require for the purpose of ascertaining the character and nature of the ground and subsoil, at their own expense and with prior approval of Mhlathuze Water before any such work is undertaken.

The contractor is likely to encounter sandy soil conditions and groundwater. The contractor is deemed to have made adequate provision in his rates for extensive shoring, sloping, and dewatering.

C3.1.6 Disclaimer

This information regarding the sub-surface conditions and material on site is provided in good faith for the Contractor's convenience as an indication of the conditions likely to be encountered. No responsibility will be accepted for, and there is no guarantee of, the information being representative of the whole area of the Works or of the various materials to be encountered. The Contractor shall be held to have satisfied himself as to the subsurface conditions to be encountered on site and to allow accordingly in his tendered rates.

C 3.2 Employer's Agenting

C 3.2.1 Employer's Design

The Employer is responsible for the design of the permanent works.

C.3.2.2 Contractor's Design

The Contractor is responsible for the design of all temporary works and all construction methods. This includes all tie ins and interconnecting works, all shoring and lateral support systems required for trenching and protection of the works, as well as protection of existing pipelines in close proximity of construction work. It is the Contractor's responsibility to prepare method statements and to prepare designs for the removal, relocation and /or reconstruction of infrastructure and facilities where applicable, that will be affected by the construction of the Works.

The Contractor is responsible for development of welding procedures and certification of welders against such procedures.

C3.2.3 Drawings

The drawings issued to Tenderers as part of the tender documents must be regarded as provisional and preliminary for the Tender's benefit to generally assess the scope of work and to develop his pricing strategy. These drawings are marked as "Tender Drawings".

The construction of the Works shall be carried out against drawing revisions marked as "for construction purposes". The Contractor has to ensure that he always refers to the latest construction drawing revision issued by the Employer's Agent.

The Employers Agent shall, at commencement of the Contract, deliver to the Contractor, copies of the construction drawings in pdf format together with any associated instructions required for the commencement of the Works.

The Employer's Agent may issue, from time to time, during the construction of the Works, revisions to previously issued drawings as may be required for adequate construction and completion of the Works. Such revisions will be in pdf format. The Contractor shall keep an updated drawing register for use on site.

The drawings issued separately to this document, for tender purposes, are listed herewith

Plan & Long Sections		
622-02-310	1	Plan & Long Section Sheet 1
622-02-310	2	Plan & Long Section Sheet 2
622-02-310	3	Plan & Long Section Sheet 3
622-02-310	4	Plan & Long Section Sheet 4
622-02-310	5	Plan & Long Section Sheet 5
Pipework & Chambers		
622-02-311		DN250 Scour Valve Chamber
622-02-312		Air Valve Chamber Type 1
622-02-313		Air Valve Chamber Type 2 & 3
622-02-318		Isolation Valve Chamber
Standard Drawings		

622-02-314	1	GRP Access Ladder
622-02-314	2	GRP Access Ladder
622-02-315	1	Standard Details
622-02-315	2	Standard Details
622-02-316		Trench Details
Mapbook		
622-02-319	1	Rising Main Mapbook
622-02-319	2	Rising Main Mapbook
622-02-319	3	Rising Main Mapbook
622-02-319	4	Rising Main Mapbook
622-02-319	5	Rising Main Mapbook
622-02-319	6	Rising Main Mapbook
622-02-320		Temporary Working Space Overview

C 3.3 Procurement

C 3.3.1 Sub Contracting

C 3.3.1.1 Scope of mandatory subcontracting

Mandatory subcontracting is specified under the section dealing with Contractors Participation Goal which forms part of the Conditions of Tender and the Contract Data where this deals with CPG requirements.

Mandatory subcontracting also pertains to the rehabilitation function and cathodic protection.

C 3.3.1.2 Selected subcontractors

Environmental rehabilitation and Cathodic Protection work will be required through a selected sub-contractor.

The Employer, with the assistance of the Employer's Agent, will prepare a detailed scope of work and or specification for the work or supply items to be executed by a Selected Sub Contractor. Alternatively work as detailed under this contract will be ringfenced and has to be executed as per the existing specifications detailed under this contract.

The Employer and the Contractor will compile a list of firms or persons acceptable to both and who will be invited by the Contractor to submit tenders for the requisite work to be carried out or goods to be supplied by Selected Sub Contractors. When the tenders are received, they will be evaluated by the Employer and the Employer will indicate which tender he requires to be accepted by the Contractor. The Contractor will be advised accordingly. The Contractor shall then accept that Tender and appoint the relevant Selected Sub Contractor.

The Contractor shall incorporate in his subcontract provisions with selected subcontractors, the requirements which will subject the selected subcontractor to the contract requirements of the main contract.

C3.3.1.3 Subcontracting Procedures

This clause is left blank intentionally.

C3.3.1.4 Attendance to subcontractors

Attendance to subcontractors is to comply with the Conditions of Contract.

C 3.3.1.5 Cathodic Protection Installations

The Cathodic Protection (CP) installations will be designed and constructed by a selected subcontractor. The Employer will advise on his choice of selected subcontractor. The Employer standard particular specification for cathodic protection will be provided once the cathodic protection selected subcontractor is appointed.

The main contractor will be required to appoint the selected subcontractor and enter into an agreement with the selected subcontractor.

The payment for the cathodic protection work will be effected from the provisional sum allowed for under section 2 of the Bill of Quantities and the Contractor will be remunerated on an extra over for costs and profits basis as shown in the Bill of Quantities. The CP subcontractor will have to be health and safety compliant in terms of the relevant legislation applicable and it will be the main contractor's duty to manage this function. The E/O rate provided by the Contractor and shown in the Bill of Quantities for the above are deemed to be full and final payment for all the Contractors costs, including coordination of CP work into the required construction programme, allowing for lead times on CP work execution and management of the CP contractor in terms of his sub contract.

C 3.3.1.6 Environmental Rehabilitation

The environmental rehabilitation of the construction site and the pipeline working corridor needs to be done by a selected subcontractor referred to the main Contractor by the Employer. This will include general maintenance of vegetation growth during construction. The rehabilitation contractor will have to be appointed from the commencement of the construction of the Works.

The payment for the environmental work will be effected from the provisional sum allowed for under the Time related Preliminary and General section and the Contractor will be remunerated on an extra over for costs and profits basis as shown in the Bill of Quantities. The environmental subcontractor will have to be health and safety compliant in terms of the relevant legislation applicable and it will be the main contractor's duty to manage this function. The E/O rate provided by the Contractor and shown in the Bill of Quantities for the above are deemed to be full and final payment for all the Contractors costs, including coordination of environmental work into the required construction programme, allowing for lead times on environmental work execution and management of the environmental contractor in terms of his sub contract.

C 3.3.2 Preferential Procurement

Preferential procurement is detailed under the tender and contract data. Refer to Schedule 11.

C 3.3.3 Use of Local Labour

The successful contractor is required to make as much use of local labour during the contract as is practically possible. To achieve this goal permanently employed personnel should be restricted to key personnel such as foremen, charge hands and those with specialised skills required to complete the work.

The target for local labour is 70% for non-specialised works, including SMMEs, and special attention must be given to the employment of women and youth. Youth are described as a person of the age of 18 to 34 years.

Local labour shall be appointed subject to the requirements of Appendixes 2 - 4, as applicable.

Page C3.11

The contractor shall appoint a Community Liaison Officer (CLO) to assist him with the selection, recruitment, and management of local labour.

The contractor shall provide transport for the appointed local labours, transport them to a central point where local labours can access the normal public transport

C 3.4 Construction

C 3.4.1 Specifications and Standards

Standard specifications amended standard specifications and particular specifications are addressed under sections C3.5.1 through C3.6 and the annexures attached in part C7.

C3.4.2 Certification of Recognised Bodies

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. Other international standards are also applicable.

The Contractor shall, when called upon by the Employer's Agent, furnish the required Standard Specification compliance certificates.

Only SANAS accredited laboratories or other institutions may be used for certification purposes. For material testing, concrete durability testing, or other the laboratory shall be approved by the Employer's Agent.

C3.4.3 Site Establishment

C3.4.3.1 Services provided by the Employer

No services or facilities are provided by the Employer.

C3.4.3.2 Facilities to be provided by the Contractor

The Contractor is responsible for:

- All Camps, Depots and Workshops as well as storage areas.
- The accommodation arrangements for Contractor's employees remain the responsibility of the Contractor in all respects. This includes arrangements for transport. (See Conditions of Contract)
- Additional space requirements which cannot be accommodated on site as made available to the Contractor

C 3.4.3.3 Storage and laboratory facilities

Storage facilities shall be suitable to ensure storage of materials and equipment and Plant on site, allowing for adequate protection.

Plant and equipment shall be stored on suitably prepared hard surfaces with adequate shade cover.

There are no specific laboratory requirements to the contract except for the fact that laboratories used need to be SANAS registered.

C 3.4.3.4 Office Space/Facilities and equipment for the Employer and Employer's Agent

Employer's Agent Office:

An office is required for the use of the Employer's Agent on site. (See SABS 1200 AB and as amended in the project specifications, specifically PSAB 3.2).

It will be a requirement of this contract that all work pertaining to the provision of the office of the Employer's Agent shall be completed in full prior to the Contractor being permitted to commence work on site.

Parking facilities:

The Contractor shall provide 4 dedicated parking areas for the Employer and the Employer's Agent for exclusive use. Parking area to be covered with suitable covering to provide 100% shade.

Ablution facilities:

A male and female ablution facility with wash hand basin shall be made available for exclusive use for the Employer's Agent and Employer.

C 3.4.3.5 Advertising rights and notice boards

Advertising rights remain with the Employer.

A notice board for the construction activities, should be erected at the construction site. The requirements of PSAB of SABS1200 apply.

C 3.4.3.6 Vehicle for Employers Agent

Not applicable.

C 3.4.4 Site Facilities

C 3.4.4.1 Source of water supply

The Contractor shall make his own arrangements for water supply connections for the camp sites and work fronts and shall be required to bear the cost of all water consumed at campsites, inclusive of the connection fees. Should reticulated water not be available at any of the work locations, the Contractor shall be responsible for sourcing and storing of potable water for consumption and hygiene and water for construction purposes.

The Contractor shall make his own arrangements for water supply connections for construction purposes. The tendered rates under the individual items in the Bill of Quantities which require water for construction purposes, shall be deemed to include all the costs of water supply.

The water quality requirements for reinforced concrete needs to be met.

Water quality requirements for pipeline disinfection shall be met.

The cost of water required to charge the pipeline for hydrostatic testing for the first time shall be borne by the Employer. (See amended standard specifications - Clause PSL 7 SABS 1200). Water for any subsequent charging required, regardless of reason, shall be for the Contractor's account.

Water for any subsequent charging required, regardless of reason, shall be for the Contractor's account.

The cost for all water required for the execution of the construction of the Works shall be borne by the Contractor, excluding the cost for the first charge of the pipeline as noted above.

Water may not be extracted from natural resources for construction purposes.

C 3.4.4.2 Source of power supply

The Contractor shall make his own arrangements for power supply connections for all camp sites and work fronts for construction purposes and he shall bear the cost of all power consumed, including the connection fees. Should it be required, the Contractor shall allow for the costs for the power supply for construction purposes, in the preliminary and general section of the BOQ.

The power supply to the proposed pump station is a matter of specification and catered for in the contract documents.

C 3.4.4.3 Location of Camps and Depots

The Contractor shall make all arrangements for camps and depots for which his rates provide shall be inclusive. The Contractor may erect a Site Camp within the existing Nsezi WTW, however the Contractor is to ensure the site camp location is approved by the Employers Agent based on the environmental impact of the site camp erection.

Should information pertaining to camps and depots become available such information shall be presented at the bid clarification meeting.

C 3.4.5 Materials supplied by the Employer

C 3.4.5.1 Pipe

The DN1500 pipe required for construction under this contract is supplied as free issue material by the Employer.

The pipe is supplied as follows:

PIPE DESCRIPTION	PIPE LENGTHS (m)	No of lengths	Coating	Lining	End Conditions
DN1500	18	213	Coating System 1,2 or 3	Solvent Free Epoxy (Lining System 2)	bevelled ended as per SANS 719 Clause 5.1.5 and SANS 719, figure 1.

It is the Contractor's responsibility to withdraw from the pipe yard only the pipe required for construction under this Contract and to ensure that, when he is active in the pipe yard, that all pipe not required for construction be safeguarded from damage. The Contractor is to note that 52 lengths of pipe will be procured under this Contract.

C 3.4.5.2 Pipe yard and pipe collection

Free issue pipe material under this contract have been procured by the Employer. The pipe specifications are shown in the section covering Particular Specifications.

Pipe to be incorporated into the Works, shall be uplifted by the Contractor against a stores requisition of the Employer, in the presence of an Employer's Representative or/and Employer's Agent Representative. Adequate notice (24 hours) needs to be given to the affected persons for attendance purposes and this work needs to be shown on the Contractor's programme.

The Contractor shall keep adequate records of his pipe upliftment activities and his pipelaying activities to ensure that he can do a pipe reconciliation of pipe material utilized. This pipe reconciliation shall be kept up to date on a weekly basis and shall form part of the permanent construction records to be incorporated into the construction dossier.

The Contractor shall be responsible for free issue pipe material upon receipt or withdrawal from the Employers yards and shall store and handle same in such a manner that it is not stolen or damaged. Any damage to uplifted pipe, caused by improper handling will be made good at the Contractor's expense.

The Contractor shall include in his tendered rates for free issue pipe material uplifting and transportation to the construction site, offloading and placement and fitting of all this free issue pipe material. The Contractor shall also include in the tendered rates for all applicable tracking, management, maintenance, handling activities for the existing pipe yard.

The Employer will not be maintaining the access road to the pipe yard. Should maintenance be required the Contractor needs to make provision for this in his tendered rates.

C 3.4.6 Existing Services

C 3.4.6.1 Location and Protection

SANS 1921-1 Clause 4.17 has relevance and is added to herewith.

All enquiries on the latest situation with services are to be undertaken by the Contractor. The location of the services shown on the drawing by the Employer were effective at the time of design only and may have changed. The time required for this has to be allowed for by the Contractor in his programme for construction.

Attention is drawn to the fact that whilst the position of the existing pipelines in servitudes, as well as other services in the vicinity of servitudes, and all other services are indicated on the drawings, this information may not be completely accurate and it will be necessary for the Contractor to communicate with the service providers and to prove, trace and expose services which the Contractor has been made aware of as a result of his interaction with service providers. The Contractor shall coordinate meetings with all relevant service providers before construction commences and take all the necessary steps to ascertain the location of existing services before commencing work on any section of the Works. The rates tendered for the location of services and proving of same as well as the updating of existing records of services, shall be deemed to include for these meetings.

The Contractor shall establish at the meetings with service providers, the lead times required to update records and he shall include for this activity in his Construction Programme.

The Contractor shall take all the necessary steps to ascertain the location of existing services before commencing any section of the Works and shall exercise the greatest care when working in the vicinity of such services. Before commencing his operations in any particular area, the Contractor shall request the latest available drawings from the relevant local Service Authorities, showing the location of their services already installed. The Contractor shall ensure that adequate time is allowed for making contact with the relevant Service Authorities

in order for them to respond meaningfully. The Contractor shall compare the latest service locations obtained from the Service Authorities with the drawings provided for construction and where required, such construction drawings shall be updated. The Employer's Agent shall be notified of any changes in service locations found on the construction drawings.

The Contractor shall take all necessary steps to protect any existing works or service whatsoever, against damage which may arise as a result of his operations on Site. The Contractor shall bear the cost of the repair of damage to any known service, the possible existence of which could reasonably have been ascertained by him beforehand.

Wayleave conditions/applications are attached to the annexure.

Work carried out on, over, under or adjacent to Eskom infrastructure, needs to be done in accordance with "ANNEX B" generic condition and E7/2 (JULY 1998)".

The Contractor shall procure the required equipment which will enable him to prove services. The Contractor shall locate existing pipes, optic fibres cables, electric cables and/or any other services by hand excavation without the use of picks, to minimise the risk of damaging existing services. The Contractor shall be held responsible for any damage caused to existing services that can reasonably be traced and located.

It is a requirement of this contract that the Contractor exposes and proves every known service within the advance work front ahead of any work being performed, in order to determine whether its level or location clashes with the designed grading of the pipeline or with the coordinates of the proposed road alignment. All services are to be proved in conjunction with each service provider prior to excavation. Such proving shall be timed to coincide with the requirements of the programme and the limitations on the length of work fronts as specified. The cost of this advance work is to be included in the tendered rates for trench excavation and all tendered rates shall be deemed to include for the exposing of known services and the proving of its location. No additional payment will be considered for the exposing and proving of services as payment for this shall be deemed to be included in existing payment items as specified in the Bill of Quantities for trench excavation and the Lump Sum provided for this purpose under Preliminary and General. The item for excavation by hand to expose unknown and known services where instructed by the Employer's Agent is for use by the Employer's Agent only on an as and when required basis.

The Contractor shall be required to indicate the X, Y and Z coordinates of all services on a drawing, once located. Claims for delays etc. arising from the non-compliance with this requirement will not be entertained.

In addition to the marking/pin pointing of known services, the Contractor is to screen the line of the proposed excavations by means of appropriate electronic tracing apparatus for other buried services, such as pipes or cables that may not be shown in services records. All services found in this manner shall be classified as known services and shall be proved as set out above.

Service connections to individual erven are to be located and handled in a manner acceptable to the Employer's Agent. Located and proved services are deemed to be known services.

Should any services which are not on the existing services layout drawings be located, the Contractor shall add the new information to the services layout drawings in order for the employer to update his information. All tendered rates for trench excavations and road works shall include for the location of services and the updating of services drawings for the Employer.

C 3.4.6.2 Relocation of existing services

It is the responsibility of the Contractor to negotiate the relocation of services of service providers, with the relevant service providers.

The Contractor shall ensure that he/she commence with such negotiations well in advance in order to be able to plan and programme such work into the programme for the construction of the Works without causing a delay to the construction of the Works.

The Contractor will be responsible for the payment of initial deposits and relocation costs and will only be reimbursed for such costs from the relevant Provisional Sum item in the Bill of Quantities on a re measurable basis, once proof of relevant payments have been received by the Employer.

C 3.4.7 Construction Equipment

C 3.4.8 Site Usage

There are restrictions on working corridor width for pipe laying and on the utilisation of the site in general. The Contractor is to familiarise himself with all the restrictive measures and ensure that his rates for the execution of the Works take into account these mentioned restrictions.

The environmental requirements are to be met at all times.

C 3.4.9 Permits and Wayleaves

The Contractor will be required to obtain the necessary approvals and comply with the relevant authorities'/landowner's 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 and landowner's during the construction of the Works.

The Contractor will be required to confirm that he has notified property owners and authorities of his intentions to exercise his right in terms of the relevant wayleaves or "permissions to occupy" in good time, before commencement of the required work on the said properties.

C 3.4.10 Practical Completion and Completion

The General Conditions of Contract states the contractual requirements for Practical Completion and Completion as milestones to be achieved during the construction process. The following minimum requirements are to be met for certifications:

Practical Completion

The C1 to C6 commissioning procedures have to be completed. This is the overriding requirement for Practical Completion.

All associated pipelines scour, and air valve systems and isolating valve systems have to be tested and certified correct and acceptable, with chambers being secured in terms of the design and construction requirements.

All cathodic protection systems have to be installed and tested and functioning as required.

Completion

All the work should be completed in terms of the requirements of the Contract before Completion will be certified.

C 3.4.11 Agrément Certificates

No alternative tenders and no tenders offering alternative materials to those stated in the Schedule of Quantities and/or Specifications will be accepted for tender purposes.

The use of alternative materials, which may be fit for purpose and are subject to an Agrément certificate, may however be considered following award of the contract providing the following are adhered to:

- A full copy of the Agrément certificate must be provided,
- The certificate must be currently active,
- All work must be done in accordance with the terms of a specific certificate for the product,
- Details of any and all variations approved by Agreement South Africa must be provided,
- Details of who will erect or install the product must be provided,

The decision as to whether alternative materials complying with the above requirements may be used will be at the sole discretion of the Employer's Agent.

C 3.5 Management of the Works

C 3.5.1 Applicable Standards and Specifications

Standard Specifications are listed under section C3.6 – Specification Data.

Amended Specifications are stated under section C3.6 – Specification Data.

Project Particular Specifications are attached under section C7 of this document.

C 3.5.2 Construction Programme

C 3.5.2.1 Time for Completion

The time for completion is stated in the Contract Data.

C 3.5.2.2 Preliminary Programme

The Contractor shall include in his/her tender, a preliminary programme for the construction of the works. This preliminary programme shall clearly indicate how the Contractor plans to perform the Works to completion within the time for completion as stipulated.

The Tenderer shall be deemed to have allowed in his tendered rates and in his preliminary programme for possible delays due to inclement weather as specified in this document.

C 3.5.2.3 Programme for the construction of the Works

The construction programme shall comply with the requirements of the General Conditions of Contract in all respects.

The Contractor's rates for work items in the Bill of Quantities shall be deemed to include for the management of the programme for the construction of the Works.

The following shall be included in the construction programme, in addition to the General Conditions of Contract requirements; as well as in its subsequent updates and adjustments as required:

1. The programme shall be prepared utilising MS Project and revisions of the programme shall be issued to the Employer's Agent in both hard copy format and electronic format.
 - a. The Contractor may utilise an alternative software package for managing the construction of the Works but the programme submitted to the Employer's Agent for approval has to be in MS PROJECT format, the latest version available at the time of commencement of the Contract. The programme submitted to the Employer's Agent for approval shall be seen as the construction programme and shall be used for all time referencing and time deliberations during construction.
 - b. Should the Contractor find that translation of his programme from a particular format into the MS PROJECT format loses essential programme elements and formatting, the Contractor shall be required to repair such discrepancies in the electronic programme version submitted to the Employer's Agent.
2. The programme shall be developed using the Critical Path Method which breaks down the project in the order in which the work components are to be executed and gives the time required to execute each component.
3. Each revision of the programme shall clearly indicate the programme name, revision number, date of issue and special variances.
4. The programme shall show ALL work items required to execute the work where such work items shall be properly grouped by main activity, and be able to be rolled up or down, depending on the detail that needs to be viewed.
5. The programme shall in general, comply with the following:
 - a. The programme work items shall be properly linked to show logic and a single critical path.
 - b. The programme shall be resourced and resources needs to be levelled to reflect reality at all times.
 - c. Critical milestones shall be shown.
 - i. Critical milestones are to be agreed with the Employer's Agent.
 - d. Accurate data shall be presented in so far as key dates and milestones are concerned, including projected completion and phased completion where required.

Page C3.19

- e. Production rates and durations are to be reasonable and practical.
 - f. Relationships between activities need to be logical.
 - g. The programme shall not reflect ownership of float.
 - h. Sub contractor's activities are to be shown and the duration for these are to be reasonable and practical.
 - i. No single activity shall have a duration of longer than 28 days.
6. The correct and applicable programme calendar shall be used at all times.
7. Method Statements shall be prepared and be supported by the construction programme.
 - a. The Method Statements shall support the programme and vice versa.
 - b. The Method Statements shall be cross referenced to the applicable quality control documentation and therefore shall be linked to quality inspections as shown in the programme.
8. The programme shall clearly indicate the obligations of the Employer's Agent and the Employer.
 - a. The Contractor's attention is drawn to the 24hour notification period specified under SANS 1921.
9. The Contractor shall include in his programme for the meetings with service providers as required under this contract as required and for meetings with other contractors to coordinate work at battery limits as detailed in this contract.
10. The Contractor shall prepare a programme that conforms to the limitations to the lengths of work fronts as stipulated under the section titled "Work Fronts" where and if applicable.
11. Performance test witnessing for, for example pump sets or valves, at factories and manufacturing plants not in the Richards Bay region, requires a notification period of 7 calendar days in order for the Employer to make arrangements for his presence should he/she wish to attend.
12. Cathodic Protection installations will be done by a selected subcontractor, approved by the Employer, as a specialist in the field of Cathodic Protection.
 - a. The Cathodic Protection installation takes place in conjunction with the installation of the Works and has to be coordinated with the planned scheduling of the Work's construction by the main Contractor.
 - b. The main Contractor, appointed for the construction of the Works under this contract shall ensure that he sets up coordination meetings and discussions with the selected Cathodic Protection subcontractor and ensure that all Cathodic Protection work is included in his programme for the construction of the Works, in such a manner that adequate timeframes are allowed for the said Cathodic Protection work.
 - c. The costs for coordination activities between the main Contractor and the Cathodic Protection subcontractor, the programming of the Cathodic Protection work and the incorporation of this into the main programme shall be deemed to be covered by existing rates as reflected in the Bill of Quantities.
13. Environmental rehabilitation will be done by a selected subcontractor, approved by the Employer, as a specialist in his/her field.
 - a. The environmental rehabilitation has to take place in conjunction with the construction of the Works and has to be coordinated with the planned scheduling of the Work's construction by the main Contractor. Compliance with the EMP and EMPr is required in this regard.
 - b. The main Contractor, appointed for the construction of the Works under this contract shall ensure that he sets up coordination meetings and discussions

with the selected Rehabilitation specialist subcontractor and ensure that all rehabilitation work is included in his programme for the construction of the Works, in such a manner that adequate timeframes are allowed for the said work.

- c. The costs for coordination activities between the main Contractor and the Rehabilitation sub-contractor, the programming of the rehabilitation work and the incorporation of this into the main programme shall be deemed to be covered by existing rates as reflected in the Bill of Quantities.
14. The Contractor shall allow in his programme for all the requirements pertaining to services, service proving and relocation, as stated in this specification.
 15. Commissioning procedures, including final training and development of the Employer's staff is a prerequisite for Practical Completion. The Contractor shall clearly show on the programme for the construction of the Works the requirements for commissioning of the Works.
 16. The construction of the Works includes newly constructed pipework to be tied into existing pipework. This necessitates the shutdown of existing supply systems. The duration of shutdowns is limited and often limited for scheduling to specific days of the week in order to provide the Employer of a fair chance to plan and limit disruptions in water supply. In order to prevent delays to the Contractor, shutdowns are to be planned well in advance in order to ensure that the coordination between the Employer and the Contractor can be such that shutdown supply risks are limited.
 - a. The Contractor is to plan and schedule shutdowns well in advance and indicate this on his programme for the construction of the Works.
 - b. The Contractor shall, well in advance of anticipated shutdowns, test isolating valves for effectiveness, in conjunction with the Employer. This is required to afford the Employer the opportunity to do maintenance on problematic valves where required. This testing of valves shall be programmed in order to mitigate the risk of delay to the construction of the Works.
 17. The work pertaining to the modifications at the Mhlathuze Weir pump station could affect the continuation of the raw water supply to existing end users. This work needs to be carefully programmed and shown on the programme in order to ensure that sequencing and disruption of supply is coordinated with the system requirements.
 18. The programme shall make provision for the application of the Construction permit, the duration of which shall be included in the contract duration and shall be planned for by the Contractor.

C 3.5.2.4 Working outside normal working hours

Normal working hours are considered to be between 07h00 in the morning and 18h00 in the afternoon, Monday to Friday with full cognisance to be taken of the information in the Tender Data and the description of working days.

All road signs, temporary road works, barricading and/or temporary structures required to make the site safe after normal working hours shall be in place after every work session or by 18h00 of every working day, whichever occurs first. No road signs, temporary road works, barricading and/or temporary structures required to make the site safe after normal working hours shall be removed before 07h00.

Working after normal working hours will not be allowed, unless it is approved by the Employer's Agent as "work required to be executed under extra ordinary circumstances".

No work will be allowed outside of normal working hours as a result of the need of the Contractor to execute work in order to improve upon his programme, as a result of the programme slipping behind schedule.

C 3.5.2.5 Progress control and reporting

The construction programme shall be updated at least once every 14 days and shall be tracked at all times. Should shorter intervals for programme updates be driven by the requirements of Clause 5.6 of the General Conditions of Contract, then these shorter intervals shall become relevant.

Delays to the critical path of the construction programme could be claimable in terms of the General Conditions of Contract should the delay be as a result of an Employers Risk. Such claims for delay, which affects the programme, shall be in terms of the General Conditions of Contract. The Contractor may however experience Contractor's Risk events which could cause delays to the critical path of the programme. The Contractor shall, within 7 days of experiencing such a Contractor's Risk event, delaying the critical path of his current programme, report to the Employer's Agent in writing what, in his opinion, caused the delay and which measures the Contractor intends putting in place, to mitigate risks of further delay.

The Contractor shall prepare monthly progress reports, which are to be submitted to the Employer's Agent. These required progress reports shall be submitted 3 days before each site meeting, the dates of which will be determined at the kick off meeting for the Contract. The reporting shall continue until all the work under the Contract has been completed up to the date of issue of a Completion Certificate.

The monthly report shall contain the following but not be limited to:

- A tracked programme with the report stating progress relative to planned progress in terms of the latest approved programme.
- Plant and labour resources on site for the preceding period.
- Safety statistics for the preceding period.
- Environmental matters that require highlighting.
- Public Relations matters that require highlighting.
- Cash flow deviations from cash flow predictions based on the approved programme

NOTE: This report as detailed above is not to be seen as a substitute for the report required to motivate reasons for delay to the critical path of the programme as stated in preceding paragraphs.

C 3.5.2.6 Weather conditions and rain delays

The Contractor shall keep accurate and detailed records of weather conditions which shall be included in his daily diary submitted to the Employer's Agent. Claims for extension of time due to abnormal weather which the Contractor considers to be worse than the expected normal conditions, will only be considered if fully motivated with supporting documentation. Agreement between the Employer's Agent and the Contractor on days affected adversely by rain shall be reached on the day of such adverse effect. Claims for rain delays shall not be agreed retrospectively, after the event, when the site conditions cannot be assessed applicably.

The Contractor shall note that his programme shall include for weather conditions that can be expected, based upon historical records. The number of days allowed for adverse weather

conditions shall be clearly shown for each month on the construction programme (refer to Contract Data).

C 3.5.2.7 Shutdowns for tie ins

Shutdowns for tie ins of pipework to existing live systems can become complex and cumbersome and work at the Weir could mean disruption of the continuously required supply. These need to be planned well in advance with the relevant authority and adequate time should be allowed to execute this work where time planning should be agreed with the relevant authority. The Contractor shall schedule the required tie in work and work at the weir into his construction programme, well in advance in order to ensure that such tie ins do not delay the progress of the Works or impact negatively on the water distribution efforts of the Employer. (In this case the relevant authority is the Mhlathuze Water)

C 3.5.3 Work Fronts for linear development

C 3.5.2.3.1 Work front definition

For the purpose of this contract, work fronts are defined as fronts where work takes place for pipe laying, that is preparation of the working corridor for pipelaying (clearing and grubbing and fencing of working corridor), excavation for trenches, bedding preparation, pipe laying and backfilling and thereafter rehabilitation of the working corridor. Work fronts pertain to the linear development component of the Contract.

A contained site is defined as the site where construction activities are taking place at a specific location, for an extended period of time for the construction of a reservoir or pump station and where such site is fenced off and protected for the duration of the whole of the contract duration.

Work fronts are divided into 3 categories:

Advance Work Front:

The **advance work front** is where services are being detected and where preparation for construction activities is taking place. The length of this work front is limited to 200m. Timeous detection and proving of services is required within this advance work front and all advance work on private properties, if required, in order to prepare the working corridor for construction, shall take place during this stage.

In general, the **advance work front** for pipe laying activities is the section where clearing and grubbing is taking place and where working corridor fencing is being erected as required and where applicable, where services are proved and relocated.

Construction Work Front:

The actual **construction work front** is the section where pipe laying activities are taking place. This is excavation, stock piling of excavated material, placing of bedding, pipe laying and pipe being bedded and backfilling to topsoil level if applicable. The length of this work front is limited to 200m.

This work front also includes the construction of manholes and associated work.

Reinstatement Work Front:

The section behind the actual construction work which has to be reinstated after pipe laying has been completed, is defined as the **reinstatement work front** The length of this work front

is limited to 200m. Work taking place in this section should be limited to top soil placement, rehabilitation and road works and chambers where required as well as the removal of working corridor fencing where applicable.

C 3.5.2.3.2 Length of work fronts

The total work front length:

The total work front length shall be limited to 600m. That is the sum of the length of the advance work front, the construction work front and the reinstatement work front. The total work front shall move along any stretch of pipeline route in a train like manner.

The Contractor's attention is drawn to limitations on work front length and working corridor width as a result of Environmental requirements.

The Contractor shall allow in his programme for the construction of the Works, for the work front length limitations as well as the internal lining reinstatement distance limitation.

The internal pipe length rehabilitation work front:

The length of internal work front for the repair to internal lining of a pipe being laid, shall not exceed 6 pipe lengths or joints.

This is an imperative limitation in order to ensure adequate conditions for lining repair, curing and inspection.

C 3.5.2.3.3 Number of work fronts

The pipeline construction work shall be limited to a maximum of 2 work fronts.

C 3.5.4 Quality

C 3.5.4.1 Quality Assurance and Quality Control

Quality assurance and control and the deployment of a system to ensure quality is the responsibility of the Contractor.

The Contractor shall, before commencing with construction activities, develop a quality control plan for the construction of the Works and agree the format with the Employer's Agent. The quality control plan shall cover each work item, shall show quality control results and shall be cross referenced with the index of the method statements that are applicable.

The Contractor has to compile a construction dossier comprising the quality documentation for the construction of the Work.

C 3.5.4.2 Method Statements

The Contractor shall furnish the Employer's Representative with a method statement for all construction activities.

Method statements shall be submitted to the Employer's Agent with the programme for construction. Method statements shall be in sufficient detail for the Employer's Agent to determine their practicality and suitability and as a minimum shall include details of construction methods, work methods, plant and equipment particulars including details of critical standby equipment.

Method statements shall refer to Quality Control plans in order to assess suitability of same for the execution of the works in terms of the set Quality Control standards.

Method statements shall be cross referenced to the relevant Quality Control documentation and upon evaluation of the programme for construction, the method statements and quality control documentation shall support the programme in order for the Employer's Agent to realistically evaluate the programme.

The Contractor is to provide U UW operations and the Employer's Agent a method statement and risk assessment for every shutdown required. This is to be provided to U UW Operations with a minimum 30-day notice period.

C 3.5.5 Dealing with water

Notwithstanding the requirements of SANS1921, the Contractor shall take adequate precautions for the protection of the works from storm water runoff during periods of prolonged heavy rainfall. The Contractor shall be responsible for dealing with all water during construction from whatever source, and the cost of all dewatering, shall be deemed to be included in the tendered rates. The Contractor shall provide temporary storm water drainage and due cognisance must be taken of the highly erodible nature of the in situ and excavated material.

The Contractor shall be responsible for all repair works necessary to reinstate any damage caused by storm water runoff. As per the Geotechnical investigations a high water table is envisaged along the pipeline route, the Contractor shall be responsible for dewatering of all pipe trenches and open excavations including well points if required, these are deemed inclusive in the tendered rates.

The Contractor shall be responsible for drawing up a Storm Water Management Plan for the handling of storm water for the duration of construction at all work fronts as well as the local site where work on the pump station is being executed. The tendered rates provided in the BOQ shall be deemed to include for all Storm Water Management issues related to the Contract at all work fronts.

The Storm Water Management Plan shall conform to the requirements of the EMPr.

C 3.5.6 Disposal of spoil and surplus material

Disposal of spoil and surplus material needs to conform with the requirements of the Environmental Management Programme and Plan.

All costs pertaining to removal and dumping of spoil are to be included in the Contractors rates for the construction of the Works.

The Employer will not accept spoiling on a third-party property, regardless of arrangements concluded upon between the Contractor and such third party property owner

C 3.5.7 Testing, Completion, Commissioning and Correction of Defects

C 3.5.7.1 Length of pipeline to be pressure tested

The testing regime for the pipelines constructed under this contract is detailed under the amended specifications, section PSL of SABS1200.

C 3.5.7.2 Commissioning

The Employer shall not take beneficial occupation of the pipeline before commissioning as per the requirements of this specification have not been completed.

The Employer shall take beneficial occupation of the pump station at the Mhlathuze Weir once the work there has been practically completed.

C 3.5.8 Requirements to accommodate traffic

Refer to SANS 1921 – VOL 2.

C 3.5.9 Survey control and setting out of the Works

Survey control and setting out of the Works is dealt with under SANS 1921.

The Contractor shall be responsible for all survey work required to set out the works. All survey data shall be signed off by a professionally registered surveyor and tendered rates in the Bill of Quantities shall be deemed to include for all the costs associated with surveying for the construction of the Works.

C 3.5.9.1 Survey beacons and control points

Survey control points will be handed over to the Contractor in conjunction with the kick off meeting.

The Contractor will be responsible for caretaking of all control points and should such points be damaged they will be re established at the expense of the Contractor.

C 3.5.9.2 Initial survey

An initial survey of the terrain where construction activities are to take place, shall be executed in a 2m by 2m grid. The survey data so obtained shall form part of the records to be compiled into the Construction Dossier.

C 3.5.9.3 Final survey

A final survey of the terrain where construction activities did take place, shall be executed in a 2m by 2m grid. The survey data so obtained shall form part of the records to be compiled into the Construction Dossier.

C 3.5.9.4 Surveying general

The Contractor shall submit the following "As-built" data to the Employer's Agent to enable him to complete the required Record Drawings before a Certificate of Completion will be issued:

- A tacky survey of the completed works carried out in accordance with TMH11: Standard Survey Methods, issued by the Committee of Land Transport Officials.
- Each point shall be suitably coded and identifiable by the Employer's Agent and shall be supplied on a computer disk in an ASCII file with the following format: Code [SPACE] X Co-ordinate [SPACE] Y Co-ordinate [SPACE] Level [SPACE] Description.
- The above information is to be given to an accuracy of three decimal places and is to be surveyed by a suitably qualified person referenced to the nearest construction benchmarks used for the project.

- In addition to the above, all as-built information must be provided on a drawing in DXF and hard (paper) copy formats showing all relevant construction information. All other surveyed information must also be shown on the drawings.
- Information requirements need to be confirmed with the Employer's Agent.

Suitable checks on the accuracy of the information provided may be carried out by the Employer's Agent and should any of the information provided be found to be inaccurate or untrue, the Employer reserves the right to withhold payment or to employ the services of an Employer's Agenting surveyor to re-survey all the works listed above, at the Contractor's expense.

C 3.5.9.5 Photographic Record

The Contractor shall prepare and submit a well indexed photographic record of the progress with the construction of the Works. The photo record shall be done in intervals not exceeding 7 calendar days over the full duration for the construction of the Works.

The format of the indexed photographic system shall be agreed with the Employer's Agent at the commencement of the Contract.

An item has been included in the Bill of Quantities in the P&G section, for the costs pertaining to the required record and the rate inserted shall be deemed to cover all costs pertaining to the compilation of the photographic record.

C 3.5.9.6 As built records and record drawings

The Contractor shall mark-up, in RED, all the conflicting information on drawings as far as nonconformance with specifications is concerned, probable different site conditions encountered compared to what has been anticipated, differences in services locations encountered compared to what is indicated on the drawings and/or approved changes in design as instructed by the Employer's Agent.

Any construction and or installation detail differing from that on the provided drawings shall be marked up. The marking up of the Employer's Agent's drawings shall be on an A0 drawing which the Contractor shall provide. The marked up drawing shall reference any relevant site queries and sketches. Upon completion of the works, the updated information must be forwarded to the Employer's Agent for incorporation into the Construction Dossier for which a full set of final Record Drawings will be prepared.

The drawings which the Contractor updates and which are marked up in RED shall be clearly marked in RED, in the top left hand corner, to reflect the words "RECORD DRAWING". Should any specific drawing not require any amendments, it will be marked in RED in the top left hand corner to reflect the words "RECORD DRAWING – NO AMENDMENTS".

The Contractor shall therefore submit to the Employer's Agent, a full set of record drawings in A0 format, marked up in RED. The tendered rates for preparing marked up record drawings shall include for all work required as well as provision of the relevant A0 hard copy. If no specific rate for preparation of marked up record drawings is provided, the cost shall be deemed to have been included in the general rates for the construction of the Works.

All marked up in red drawings shall be submitted as a prerequisite for Completion certification.

C 3.5.10 24 Hour response team

The contractor shall make available, a 24 hour response team for maintenance of the site and Work during construction where public access is possible.

C 3.5.11 Management of the Environment

The requirements of the EMPr shall apply.
The EMPr is attached under the annexures of this document.

C 3.5.12 Security

The Contractor is responsible for all security measures required on site and at work fronts of the linear development component of the construction of the Works.

All costs required for security measures taken on site shall be deemed to be covered in the billed rates of the Bill of Quantities.

C 3.5.13 Management Meetings

The Contractor shall attend regular site meetings as and when these are required by the Employer. The objectives of such meetings will be to review progress and ensure compliance with the programme, discuss, and where possible solve any problems that may arise and generally liaise with all parties concerned with the works.

The cost of attending such meetings shall be included in the tendered price and instructions given by the Employer's Agent at such meetings and confirmed in the notes of the meeting shall be considered as a written instruction by the Employer's Agent, as referred to in the General Conditions of Contract. This does not pertain to specific requirements under the General Conditions of Contract in so far as written instruction and response is concerned.

Site Meetings will generally be held every once a month, but special meetings may be convened as and when required.

The requirements of CPG Partners attending site meetings as per the Contract Data shall be adhered to.

C 3.5.14 Daily Records

The Contractor shall keep a daily site diary in which at least the following minimum data will be reflected:

- Work executed.
- Plant and machinery deployed on site.
- Rainfall recorded.
- Agreement to rain delays.
- Manpower deployed to site
- Disruptions for the day.

The daily diary shall be submitted to the Employer's Agent on a daily basis. The previous day's diary shall be with the Employer's Agent by 10h00 on the following working day. The Employer at any given time should have access to the signed site diaries.

C 3.5.15 Format of communications

Formal communication under this Contract shall comprise the issue and receipt of the following:

- Official correspondence issued under transmittal slip, which includes claim and dispute documentation as required by the contractual processes.
- Issue of Site Instructions by the Employer's Agent.
- Variation Orders issued by the Employer's Agent.

- Requests for information submitted by the Contractor to the Employer's Agent, in writing in a predetermined format.
- Notes on meeting proceedings, signed off by attending organisations' representatives.

NOTE: random e mail correspondence generated and distributed does not constitute official correspondence and communication under this Contract.

C 3.5.16 Payment certificates

Measurement for payment purposes will take place between the 20th and 25th of each month. The Contractor needs to submit his monthly payment claim to the Employer's Representative by the 26th of each month.

Should any of these noted dates fall on a nonworking day or a special nonworking day, the following working day shall be applicable.

The Transfer of Rights declaration (cession document) must be submitted together with any claim made for payment. No payment for Goods or materials will be made without such a declaration. During the kick of meeting, the contractor must indicate if he/she will require the cession payment.

Mhlathuze Water does make electronic payments. The Contractor will be responsible for supplying correct bank details to the Employer for electronic payments and the Employer will not be held responsible for any incorrect bank details supplied by the Contractor.

The Employer does not accept Bonds or Guarantees for retention.

C 3.5.17 Employment of local labour and job creation

C 3.5.17.1 Local Labour Statistics

Labour statistics shall be provided to the Employer via the Employer's Representative in a format agreed at commencement of the Contract.

The payment for this shall be included in the Contractor's rates for time related Preliminary and General rates.

The Contractor shall as a minimum provide, on a monthly basis, together with his payment claim, the statistics of all labour employed under the Contract where such statistics shall as a minimum, show for each employee, the name, ID number, address, age, gender, disability level if applicable. A certified copy of employee's ID book cover page may be requested.

C 3.5.17.2 Community Liaison Officer and ISD Consultant

Stakeholder management and facilitation includes the deployment of a Community Liaison Officer and an ISD consultant under this contract. A provisional sum is allowed in the Bill of Quantities for this.

The coordination of the progress with the Works with the community and matters affecting the community in which the Contract is being undertaken shall be coordinated through the appointed ISD with assistance from the CLO.

The Contractor will be required to provide assistance to the ISD consultant as and when required.

C 3.5.18 Training

C 3.5.20 Health and Safety

C3.5.20.1 Health and Safety Requirements and Procedures

This clause shall be read in conjunction with the Health and Safety Specification, included in this document. Anything set out in connection with the Safety Act in this document is supplementary to and in no way replaces, alters or supersedes the provisions of the Occupational Health and Safety Act 1993 (Act 85 of 1993) and the Constructional Regulations 2014, which shall be complied with at all times.

A) in terms of the provisions of Section 37(2) of the *Occupational Health and Safety Amendment Act, 1993* (Act 85 of 1993), hereinafter referred to as the Act, the following arrangements and procedures shall apply between the Contractor and the Employer to ensure compliance by the Contractor with the provisions of the Act:

- (i) The Contractor undertakes to acquaint the appropriate officials and employees of the Contractor with all relevant provisions of the Act and the Regulations promulgated in terms of the Act.
- (ii) The Contractor undertakes that all relevant duties, obligations and prohibitions imposed in terms of the Act and Regulations on the Contractor will be fully complied with.
- (iii) The Contractor accepts sole liability for such due compliance with the relevant duties, obligations and prohibitions imposed by the Act and Regulations and expressly absolves the Employer from himself being obliged to comply with any of the aforesaid duties, obligations and prohibitions, with the exception of such duties, obligations and prohibitions expressly assigned to the Employer in terms of the Act and its associated Regulations.
- (iv) The Contractor agrees that any duly authorised officials of the Employer shall be entitled, although not obliged, to take such steps as may be necessary to monitor that the Contractor has conformed to his undertakings as described in paragraphs (i) and (ii) above, which steps may include, but will not be limited to, the right to inspect any appropriate site or premises occupied by the Contractor, or any appropriate records or safety plans held by the Contractor.
- (v) The Contractor shall be obliged to report forthwith to the Employer and Employer's Agent any investigation, complaint or criminal charge which may arise as a consequence of the provisions of the Act and Regulations, pursuant to work performed in terms of this Contract, and shall, on written demand, provide full details in writing, to the Employer and Employer's Agent, of such investigation, complaint or criminal charge.
- (vi) The Contractor shall furthermore, in compliance with Constructional Regulations 2014 to the Act acquaint himself with the requirements of the Employer's Health and Safety Specification as laid down in Regulation 4(1)(a) of the Construction Regulation 2014, and prepare a suitably and sufficiently documented health and safety plan as contemplated in Regulation 5(1) of the Construction Regulation 2014 for approval by the Employer or his assigned agent. The Contractor's Health and Safety Plan and Risk Assessment shall be submitted to the Employer for approval within fourteen (14) days of the Commencement Date and shall be implemented and maintained from the commencement of the works.
- (vii) The Contractor shall at all times be responsible for full compliance with the approved plan as well as with the Construction Regulations and no extension of time will be considered for delays due to non-compliance with the abovementioned plan or regulations.
- (viii) The Employer, or his assigned agent, reserves the right to conduct periodic audits, as contemplated in the Construction Regulations 2014, to monitor that the Contractor is compliant in respect of his obligations. Failure by the Contractor to comply with the requirements of these Regulations shall entitle the Employer's Agent, at the request of the Employer or his agent, to suspend all or any part of the Works, with no recourse whatsoever by the Contractor for any damages incurred as a result of such suspension, until such time that the

Employer or his agents are satisfied that the issues in which the Contractor has been in default have been rectified.

- (ix) The proposed type of work, materials to be used and potential hazards likely to be encountered on this contract are detailed in Section C3.4: Construction, the Bill of Quantities, the Drawings, and in the Employers' Health and Safety Specification (Regulation 4(1) of the Construction Regulations 2014).
- (x) In terms of Construction Regulations 5(1)(q): The Clients OHS Agent , Employer's Agenting consultant, RE or Mhlathuze safety specialist or officer can stop any contractor from executing a construction activity which poses a threat to the health and safety of persons which is not in accordance with the client's health and safety specifications and the principal contractor's health and safety plan for the site. The contractor or contractors shall not be compensated for any time lost.

Payment items are included in the Bill of Quantities to cover the Contractor's cost for compliance with the OHS Act and the abovementioned regulations.

C 3.5.20.1 Employer's Health and Safety Plan

The Employers Health and Safety plan is attached under the Particular Specifications.

C 3.5.20.2 Contractor's Health and Safety Plan

The Contractor's Health and Safety plan shall comply with the requirements of the legislation applicable.

The Contractor, shall, immediately after appointment for the construction of the Works, make contact with the Employer's appointed Health and Safety agent and familiarise himself with the requirements of the Health and Safety plan for the construction of the Works.

The appointed Health and Safety Representative for the Employer (Health and Safety Practitioner) will be introduced at the hand over meeting for the Contract.

The OHS plan shall include but not limited to the following:

- Principal contractor OHS Policy
- **Legal and other requirements:** Principal contractor must specify what legal and other requirements will be applicable to the construction process:
- **Hazard Identification and Risk Assessment:** The principal contractor must in detail demonstrate how, when, where, what type of risk assessments and by who risk assessments will be conducted?
- **Objectives and targets:** Objectives and targets must be set and detailed description to be given how objectives and targets will be reached
- **Resources, Roles and responsibilities:** Appointments, who will be appointed for what.
- **Competency training and awareness.** Detailed description of what training will take place, including induction, job specific training and external training.
- **Communication:** Types of communication that will take place. Meetings and frequency of meetings (OHS committee meetings / site meetings. Monthly reports.
- **Performance monitoring:** What types of monitoring would be done: Inspections/ PTO's etc.
- **Inspections:** Inspections, frequency of inspections a people responsible for inspections.
- **Incident Management and Investigation:** Who, when, why, where and how incidents will be managed.
- **Audits:** Types of audits and frequency of audits
- **Signage:** Signage that will be used

- **Access control / Security**
- **Public Health and Safety**
- **Traffic Management and accommodation**
- **PPE Management**
- **First Aid arrangements**
- **Emergencies**
- **Management of subcontractors.**
- **Control of Documents**
- **Occupational Health and Safety budget**
- **Operational control:** This refers to the material, equipment and activities that will take place on site based on the scope of works and will be as follows:
 - Signage
 - Permit to work
 - Equipment transport to site. Delivery and offloading.
 - Construction employee facilities
 - Stacking and Storage
 - Housekeeping
 - Waste management
 - Construction vehicles and mobile plant
 - Hand tools
 - Temporary electrical installations
 - Electrical work
 - Use of portable electrical tools
 - Ladders
 - Scaffolding
 - Clearing and grubbing. Vegetation clearance
 - Excavations
 - Bedding and Backfilling
 - Lifting machines and lifting equipment
 - Lifting operations
 - Welding and flame cutting activities
 - Vessels under pressure
 - Grinding / Using circular saws
 - Cathodic protection
 - Soil moisture and density gauges. Soil moisture and density tests
 - Portable x-ray machines. X-ray of joints
 - Steel fixing
 - Form work and support work / Casting concrete
 - Working in a fall risk position.
 - Scaffolding
 - Tie in to existing services
 - Confined spaces
 - Installing negative pressure relief and pressure relief backflow valves.
 - Cleaning and reconnecting of surge tank.
 - Electrical and mechanical works.
 - Adverse weather conditions
 - Use and storage of flammable liquids
 - Hazardous chemical substances
 - Dangerous animals.
 - Working close to water environments
 - Lighting
 - Ventilation

- Noise
- Covid 19

The Contractor's Health and Safety Plan will be subject to approval by the Employers OHS Agent, 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 and construction work permit for the project.

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

C 3.5.20.3 Cost of statutory compliance

An item has been inserted in the preliminary and general section of the Bill of Quantities for costs pertaining to compliance with the statutory requirements pertaining to Health and Safety. Rates provided under this contract are deemed to cover all costs applicable to Health and Safety compliance.

C 3.5.20.4 Barricading and Lighting

Barricading and lighting are covered under the amended specification section PSD of SABS 1200 and SANS 1921.

The Contractor shall comply in all aspects with the requirements of the Occupational Health and Safety Act (Act 85 of 1993) and the Constructional Regulations 2014.

The Contractor shall erect and maintain for the duration of the contract adequate barricades in the form of fencing, or other approved methods, to prevent unauthorised access to the Site, and in particular any excavations, by the general public.

Trench excavations for pipelines shall be barricaded on both sides along the entire length of open trench. Where trenches are excavated within road reserves and where it may be reasonably expected that vehicular traffic may be encountered in areas outside of road reserves, the Contractor shall provide, maintain and keep lit between sunset and sunrise, warning lamps placed at regular intervals not exceeding 50m along the length of open trench on the side facing the street or direction from which traffic may reasonably be expected.

The Contractor shall, in connection with the Works, provide and maintain all signs, signboards, lights, barriers, barricades, fencing and watching when and where

- a) specified in or reasonably to be inferred from the Contract, or
- b) required by any competent statutory or other authority, or
- c) required by the Employer's Agent for the protection of the Works or for the safety or convenience of the public or others.

C 3.5.20.5 Traffic control and management

Refer to SANS 1921.

C 3.5.20.6 Aids Awareness

Refer to SANS 1921 – Vol 6.

C 3.5.20.7 COVID-19

The Contractor is to comply fully with the requirements of the Baseline Risk Assessment, Health and Safety Specification and applicable Government Legislation with respect to working under the conditions necessary to reduce the risk of spreading of the COVID-19 pandemic, and the Contractor shall allow for all time and costs as necessary.

The cost of complying with the requirements of this clause shall be deemed to be included in the rates tendered.

C3.5.20.8 Protection of the Public

The Contractor shall at all times ensure that his operations do not endanger any member of the public.

The Contractor shall take special precautions to prevent public access to any dangerous areas on the works, e.g. by temporary barricades and / or fencing.

C3.5.20.9 First Aid and Site Safety

The Contractor shall be the responsible party on Site to ensure that the Occupational Health and Safety Act 1993 (Act 85 of 1993) including the Constructional Regulations 2014 and any other statutory obligations on safety are strictly adhered to and administered. The Employer shall not be held liable for safety on Site or anywhere else where the Contractor is active. In addition, the Contractor shall develop a site-specific organogram. Responsible persons shall delegate responsibilities and accountabilities to competent personnel. They shall be appointed in writing. Duties and responsibilities in terms of OHS shall be clearly defined in appointment letters.

C3.5.20.10 Expected Health and Safety Risks

Listed below are, which may not be all, the expected health and safety related risks that may be encountered during the contract duration. The Contractor shall identify and prepare assessments for all risks he is likely to encounter in the execution of the contract before commencing with any work.

Further assessments shall be prepared as and when required for any other risks identified during the construction phase before work involving such risks is undertaken.

Hazard / Risks	Risk Rating	Significance
Covid 19 Exposure	300	Very high risk
Working inside deep excavations (big possibility that sidewalls can collapse)	300	Very high risk
Working in confined spaces	300	Very high risk
Cleaning Surge tank	300	Very high risk
Competency and experience of contractors	300	Very high risk
Not complying with legal and other requirements	300	Very high risk

Hazard / Risks	Risk Rating	Significance
Unskilled workers	180	High risk
Transportation of employees.	180	High risk
Transportation, delivery and offloading of material and equipment to site.	180	High risk
Lifting machines, lifting equipment and lifting operations	180	High risk
Installation of DN 1500 pipe	180	High risk
Moving, placing bedding / backfilling material on the edges of excavated areas ((big possibility that sidewalls can collapse)	180	High risk
Temporary works	180	High risk
Working in a fall risk position	180	High risk
Building and working on scaffolding	180	High risk
Electrical and mechanical work	180	High risk
Inadequate access and egress routes to/from site	180	High risk
Insufficient emergency evacuation and response plans	180	High risk
Clearing and Grubbing: Dangerous snakes.	180	High risk
Insufficient health and safety budget	144	High risk
Welding and flame cutting operations.	144	High risk

C3.5.20.10 Expected Health and Safety Risks

The Works shall be constructed in accordance with the relevant Government Acts and Regulations and in particular "The Occupational and Health and Safety (Act No. 85 of 1993) and the Construction Regulations 2014".

All apparatus and material supplied and all work carried out shall comply in all respects with the Act.

The Contractor must comply with the requirements of the Act and inform his employees and Sub-contractors regarding regulations, safety requirements, inspections, etc.

The specific health and safety conditions imposed by the Employer (refer the OHASA Agreement under "Forms to be completed after award of Tender" in Volume 1 of the Tender

Document) also apply and take precedence where in conflict with the Occupational Health and Safety Act. This Agreement must be signed upon award of the Tender.

The Contractor exempts both the Employer and the Employer's Agent for the safety of his work on the Site. The Contractor assumes the responsibility in terms of Section 16(1) of the Occupational Health and Safety Act. If the Contractor delegates any duty in terms of Section 16(2), a copy of each written delegation shall immediately be handed to the Employer's Agent.

By accepting the Contract, the Contractor warrants that all his and his Sub-contractor's workmen are covered in terms of the Compensation for Occupational Injuries and Diseases Act (Act No. 130 of 1993), which cover shall remain in force whilst any workman is present on the Site.

C 3.5.21 Contractors Key Personnel for duration of contract

The Contractor is to ensure at minimum the following key staff in terms of supervision is deployed for the entire duration of the contract:

- **Contract Manager**
NQF Level 7 (B.Tech) or higher in Civil Employer's Agenting with relevant experience.
- **Construction Manager**
NQF Level 6 (N.Dip) or higher in the Civil Employer's Agenting field with relevant experience.
This Construction Manager shall be responsible for all aspects of the Works on behalf of the Contractor, including receiving instructions, providing quotations, attending meetings, dealing with contractual correspondence (as delegated by the Contract's Manager), payment certificates, preparation of programs and cash flows, and the like. The Construction Manager shall also have the authority to commit the Contractor to all contractual aspects of the Contract. The Construction Manager shall be appointed in writing in full accordance with the requirements of clause 4.12.2 of GCC 2015.
- **Concrete foreman**
Concrete foreman with relevant experience required.
- **Civils Lead/Pipeline foreman**
Civils Lead / Pipeline foreman with relevant bulk steel pipeline experience required.
- **Health and Safety Officer**
Client OHS specifications section 9.2.3: Principal Contractor shall appoint a full-time construction health and safety officers that are registered with the South African Council for Project and Construction Management Professions as an occupational health and safety officer with the following qualifications:
 - NADSAM / SAMTRAC / NEHBOS / Equivalent
 - Registered as Construction health and safety officer at SACPCMP
 - Hazard Identification and risk assessment (HIRA)
 - Legal Liability
 - Incident Investigation level 3
 - Minimum of 6 years' ***OHS experience in construction (not other industries)***
- No health and safety officer or health and safety manager will be allowed on site if not registered with the SACPCMP.

The Principal Contractor shall appoint a full-time construction health and safety officers that are registered with the South African Council for Project and Construction Management Professions as an occupational health and safety officer. The full-time

Page C3.36

construction health and safety officers will report to a construction health and safety manager that is registered with the South African Council for Project and Construction Management Professions as an occupational health and safety manager. The Construction Health and Safety Manager shall visit the site once a week to assist the appointed OHS officer.

- **Quality Control Officer**
Quality Control Officer with relevant experience required.

All key personnel will be required to attend the monthly progress meetings, apart from the Internal Pipeline Corrosion Specialist which will only be required to attend from time to time when applicable work is taking place on site.

Senior personnel such as the Construction Manager, Assistant Construction Manager and/or General Foreman shall be always on site to control and supervise the site activities. No work may be undertaken without these senior personnel on the site and the Employer's Agent reserve the right to suspend the works if these personnel are not present. No claim for additional time or cost will be allowed for such site closure due to the senior personnel not being present on site.

The Contractor shall provide the Employer's Agent with the full names, qualifications, experience and contact details of his key personnel within seven (7) days of the commencement date of the contract. The Contractor's Key Personnel shall be the person proposed in this tender. If this is not possible, alternative CV's, of similar qualification and experience, or better, to that submitted for the tender, shall be submitted to the Employer's Agent for consideration. Acceptance and suitability of alternative persons shall be at the sole discretion of the Employer's Agent.

The Contractor shall be required to strictly observe his obligations regarding adequate full time superintendence of the Works, with particular reference to accuracy of setting out, excavations, correct steel fixing, properly constructed formwork, positioning of foundation bolts, and / or bolt pockets, placing of concrete, pipe laying etc. as applicable, in order to achieve the high standard of workmanship required of him.

Adequate facilities for superintendence of his work shall be provided by the Contractor and the Employer's Agent's Employer's Agenting staff must under no circumstances be expected to act in this capacity on his behalf.

C 3.5.22 Implementation Methodology

Disruption of the Nsezi Raw-Water transfer and Water Treatment Plant must be avoided as far as practically possible throughout the duration of the contract.

The Contractor shall therefore undertake the Works in a manner that ensures no unnecessary disruption of the Nsezi Raw-Water transfer and Water Treatment Plant. The number of supply system shutdowns must be kept to an absolute minimum with the duration of any shutdown as short as possible.

Tenderers shall provide information as part of the method statements submitted with their tenders as to the number, sequence, and durations of proposed supply system shutdowns.

Note: No supply system shutdown shall be allowed at any time or for any reason whatsoever without the written permission of the Employer's authorised official responsible for the contract. Should the Contractor fail to adhere to this requirement, the full costs of any nature whatsoever incurred by the Employer in ensuring continuation of the services to consumers shall be charged to and recovered from the Contractor. This shall include the full cost of any penalties charged to the Employer by industrial and other consumers.

These methodologies will be binding upon the Contractor unless he indicates in his tender alternate methodologies which clearly offer less risk to service interruption than that proposed in which case these methodologies will be binding upon the Contractor. Whether the alternate methodology is accepted or not, it will remain the Contractor's responsibility to ensure that service disruption (ie planned shutdowns) is kept to a minimum and complies with the terms of the contract.

The Contractor shall liaise with Mhlathuze Water, and his appointed agent, with regard to the timing of the work so as to fit in with the operational requirements of the TREATMENT WORKS. This shall particularly apply to operations which require the shutting down of the SERVICES supply, as alternate services arrangements must be made. Mhlathuze Water requires 14 days' notice of any such shutdown.

The Employer's Agent's approval of the shutdown shall be obtained in writing. Supporting documentation to the programme shall identify "Critical" equipment (see below).

The shutdown programme shall include a task for a "dry run" at which time all materials, plant and equipment shall be checked on site. All costs associated with this dry run are to be included in the Contractors rates.

The dry run shall establish inter alia that all equipment materials are on site with particular attention being paid to the availability and correctness of pipework and fitting dimensions, flange drilling, gasket material, nuts, bolts and spanners and standby equipment identified as "Critical". Critical equipment will be deemed to be all plant/ equipment/ material where failure would compromise the ability to timeously complete the shutdown.

The Employer's Agent reserves the right to terminate planned shutdown / supply interruption if, after consultation he is of the opinion that the shutdown will not be completed timeously, and that continued effort would result in additional and unnecessary disruption of water service.

All shutdowns shall be carefully coordinated with the Employer's Agent to ensure that Operations staff are given maximum opportunity to charge reservoirs and thereby mitigate service disruption to consumers. Shutdowns shall be interspersed by a minimum operational period of 96 hours, unless otherwise approved by Mhlathuze Water.

C 3.5.23 Guarantees

The Contractor shall be liable for, and shall guarantee, all work undertaken by him under the terms of the Contract and for the period of Defects Liability.

The Contractor shall accept and have full responsibility for the adequacy and compatibility of all items of plant and equipment required under this contract.

C3.5.24 Environmental Management

C3.5.24.1 Methods and Procedures

The following, together with the Construction Environmental Management Programme, shall be applied with regard to the operation and maintenance of the site:

- Before setting up any construction work camp or stockpile site for equipment, the Contractor (or sub-contractor) must liaise with the Employer's Agent and the relevant landowner and reach agreement regarding the location, layout and demarcation of any camp to be established, including any compensation to be paid to the landowner;

- All equipment and materials, particularly potentially hazardous substances, shall be securely stored in lockable structures and all reasonable steps taken to prevent theft or use by unauthorized personnel;
- The site shall at all times be kept in a neat and tidy condition. Papers and packaging shall be binned and removed from site and waste stockpiles shall be properly demarcated and the waste removed at regular intervals and disposed of at a registered waste disposal site.
- Natural vegetation shall not be damaged unnecessarily and the working areas of the site be kept to the minimum reasonably possible for construction. An environmental awareness training programme for the construction staff should be implemented by the Contractor/sub-contractor(s) and all workers made aware of the recommended mitigation measures to be implemented.
- No wild animals (birds, snakes, lizards, game, etc.), domestic stock or indigenous plants are to be disturbed unnecessarily in any way by the construction activities or by the construction staff.
- All topsoil (containing indigenous plant seeds, rootstock, etc.) removed – that may be required in future rehabilitation – should be carefully stockpiled for later rehabilitation.
- Measures need to be taken to ensure that contamination from the work camp and lay-down site does not pollute adjacent areas. This should include the diversion of natural run-off away from the works and the containment thereof in drainage retention areas, where applicable.
- Water from dewatering operations shall be disposed of so as not to return to the working area nor to cause damage or erosion to surrounding areas.
- Dust from stockpiles and access roads shall be controlled by watering.
- Precautions need to be taken against oil spillage from heavy equipment through the use of sand or sawdust drip trays. All material (including soil) contaminated with hydrocarbons should be disposed of as hazardous waste at a registered waste disposal site.
- Any object of historical interest that may be uncovered in the course of the works shall immediately be protected and reported to the Employer's Agent for further action. There is a legal requirement to report any archaeological site of cultural significance to the National Monuments Council, according to the National Heritage Act (Act No. 25 of 1999).
- The Contractor shall check and supervise his own work and the work of his sub-contractors to ensure that all work is carried out in accordance with the EMP.
- Sources of imported material shall be listed and approved by the ECO and shall be free of weeds, seeds of alien plants, litter and contaminants;
- No hazardous substances may be disposed of on site;
- The storage of flammable liquids and substances should strictly comply with specifications;
- Adequate fire-fighting equipment must be readily available at the materials storage and dispensing areas;
- Adequate precautions shall be provided to prevent spillage during the filling of any tank with flammable and hazardous liquids and during the dispensing of the contents;
- The site shall at all times be kept in a neat and tidy condition – papers and packaging shall be disposed of into scavenger- and weatherproof bins and the waste removed at regular intervals;
- Wherever possible, materials used or generated by construction shall be recycled;
- Provision shall be made for employee facilities including shelter, toilets, washing and eating facilities;
- Sanitation facilities supplied by the Contractor for the workers shall be maintained in a hygienic state and serviced regularly;
- Contaminated water, run-off and/or effluent should be prevented from discharging into the groundwater, any water course, drain or sea and should be

contained and disposed of at a site approved by the Employer's Agent and Local Authority;

- Water from dewatering operations shall be disposed of so as not to return to the working area nor to cause damage or erosion to surrounding areas;
- Dust shall be minimized as far as reasonably possible and controlled by watering;
- Natural vegetation shall not be damaged unnecessarily and the working areas of the site and along the pipelines shall be kept to the minimum reasonable possible for construction;
- The Contractor should manage and minimize any noise generated on site so as not to disturb nearby residents;
- Final audit: On completion of the works, but before the construction site is handed back to the Employer, a thorough environmental inspection or audit impacted by the construction activities shall be carried out and any 'problematic' or damaged areas shall be made good or rehabilitated to the satisfaction of all parties.

C3.5.24.2 Fires and Burning of Vegetation

Under no circumstances whatsoever may fires be lit anywhere on the site of the Works.

C3.5.24.3 Preservation of Flora and Fauna and Soil Conservation

The Contractor shall :

- a. take all precautions to prevent:
 - i) any damage to trees, shrubs and the surrounding natural environment,
 - ii) fires,
 - iii) loss or injury to domestic or wild animals from any lands used or occupied by the Contractor
- b. refrain from destroying, removing or clearing trees, timber and scrub to any extent greater than is absolutely necessary for the execution of the contract
- c. ensure that no vegetation, trees or shrubs outside the site boundaries are disturbed, damaged or destroyed. A penalty of R1,000 per incident may be charged to the Contractor,
- d. take care to cause the minimum disturbance to the fauna and flora,
- e. take measures as to ensure that his employees are aware of and abide by all laws and restrictions governing the hunting, disturbing, capturing or destroying of animals and birds in the vicinity of the camp or the Works or the taking of fish from any water; and
- f. prohibit all firearms from the site and temporary camps.

C3.5.24.4 Protection of Trees, Shrubs and Surrounding Environment

The Contractor shall ensure that no trees, shrubs or the surrounding natural environment outside the site boundaries are disturbed, damaged or destroyed.

A penalty of R1,000 per tree or shrub damaged or destroyed or for damage to the natural surrounding environment may be charged to the Contractor. The Employer's Agent shall have the right to permanently exclude any person from the site who causes any damage to the natural environment.

C3.5.24.5 Prevention of Poaching

The Contractor shall ensure that none of his employees partake in any poaching activities of any nature during the duration of the contract.

Any person caught poaching shall be banned from the site of the Works and shall be prosecuted under the relevant laws.

The Contractor shall be liable for a fine of R5,000 for the first incidence of poaching committed by any of his employees, whether the employee is prosecuted or not. The fine shall double for each and every incident thereafter up to a maximum of R20,000 per incidence. Repeated incidents may be considered as cause for cancellation of the contract in terms of Clause 9.2.1.3.5 of the GCC 2015.

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PART C3

SCOPE OF WORKS

C 3.6 Specification Data

The Specification Data gives amendments and additions to the specifications that are listed in the List of Applicable Specifications. Clause headings are prefixed by the letters "PS" followed by alphabetic and numeric characters which identify the specification and main clause of the applicable specification. Where the Specification Data sub-clause is an addition and there is no appropriate clause in the applicable specification to which to link it, a new clause number is given following the last clause number used in the specification. New clauses are followed by an asterisk (*).

Should any requirement of the Specification Data conflict with any requirement of the specifications listed, the requirement of the Specification Data shall prevail.

Where the context requires, words importing the singular also include the plural and vice versa, and words importing the masculine gender also include the feminine and neuter.

List of applicable Standard Specifications

APPLICABLE SABS STANDARDS

The standard specifications on which this contract is based are the South African Bureau of Standards Standardized Specifications for Civil Employer's Agenting Construction SABS 1200.

Although not bound in, nor issued with this document, the following sections of the Standard Specifications of SABS 1200 shall form part of this Contract:

Specification	Series	Year	Title
SABS 1200	A	1986	General
SABS 1200	AB	1986	Employer's Agent's Office
SABS 1200	C	1980	Site clearance
SABS 1200	D	1988	Earthworks
SABS 1200	DB	1989	Earthworks (pipe trenches)
SABS 1200	DK	1996	Gabions and Pitching
SABS 1200	G	1982	Structural Concrete
SABS 1200	GE	1984	Pre-Cast concrete
SABS 1200	HA	1990	Structural Steelwork (Sundry Items) including GRP
SABS 1200	L	1983	Medium pressure pipeline
SABS 1200	LB	1983	Bedding (pipes)
SABS 1200	LC	1981	Cable Ducts
SABS 1200	LE	1982	Stormwater Drainage
SABS 1200	MM	1984	Ancillary Works

The variations to and additions to the standard specifications are included under the section called Amended Standard Specifications and are prefixed "P" followed by the standard clause alphabetical reference. Such amendments take precedence over the SABS Standard Specification.

Particular Specifications are included under the section called Particular Specifications.

Where a Particular Specification is in conflict with either the variations and additions to the standardised specifications or the SABS/SANS Standard Specifications, clarification shall be obtained from the Employer's Agent.

APPLICABLE SANS SPECIFICATIONS

The following SANS specifications are also applicable to this document, unless amended in any particular specification or shown as an amended standards specification. The Contractor is advised to obtain these standard specifications from Standards South Africa (a division of SABS) in Pretoria.

Specification	Year	Title	Applicable to:
SANS 62 - 1	2013	Steel Pipes Part 1 – Pipes suitable for threading and of nominal size not exceeding 150mm	
SANS 62 - 2	2009	Steel Pipes Part 2 – Screwed pieces and pipe fittings of nominal size not exceeding 150mm	
SANS 0100 - 2	2014	The Structural use of Concrete - Materials and execution of work	
SANS 0102 - 1	2013	The selection of pipes for buried pipelines - General Provisions	PSLB
SANS 121	2011	Hot dip galvanised coatings on fabricated iron steel articles – Specification and Test Methods	PSL
SANS 135	2011	Metallic coatings – Electrodeposited coatings of nickel plus chromium and of copper plus nickel plus chromium	PSL
SANS 136	2008	Metallic Coatings – Electrode deposited coatings of nickel	PSL
SANS 227	2007	Burnt Clay Masonry Units	PA_Brickwork
SANS 657	2011	Steel tubes for o-pressure purposes Part 1: Sections for scaffolding, general Employer's Agenting and structural applications	PSMM
SANS 664 - 1	2011	Wedge gate and resilient seal valves for waterworks: Part 1: General	PSL
SANS 664 - 2	2011	Wedge gate and resilient seal valves for waterworks: Part 2 Wedge gate valves	PSL
SANS 664 - 3	2011	Wedge gate and resilient seal valves for waterworks: Part 3 Resilient seal valves	PSL
SANS 665-1	2012	Wedge Gate Valves and Resilient Seal Valves for general purposes: Part 1	PSL
SANS 665-2	2011	Wedge Gate Valves and Resilient Seal Valves for general purposes: Part 2 - Wedge Gate Valves	PSL
SANS 665-3	2011	Wedge Gate Valves and Resilient Seal Valves for general purposes: Part 3 - Resilient Seal Valves	PSL
SANS 675	2009	Zinc coated fencing wire	
SANS 677	2010	Concrete non – pressure pipes	PSLE, PSLG
SANS 719	2008	Electric welded low carbon steel pipes for aqueous fluids (large bore) (200mm nominal bore to 2230mm)	PSL
SANS 763	1997	Specifying hot dipped galvanising	PSG, PSMM

Specification	Year	Title	Applicable to:
SANS 830	2009	Performance standards in building - Principles for their preparation and factors to be considered	PSG
SANS 861	2008	Method	PSG
SANS 863	2011	Continuous totalizing automatic weighing instruments - Belt weighers	PSG
SANS 878	2012	Ready mixed concrete	PSG
SANS 929	2008	Plywood and composite board	PSLE
SANS 974-1		Rubber gaskets	PSLE
SANS 1083	2006	Aggregates from natural resources – Aggregates for concrete	PSG, PSMF
SANS 1085		Concrete testing	PSG
SANS 1090	2009	Aggregates from natural resources - Fine aggregates for plaster and mortar	PA_Brickwork
SANS 1117	2007	Plastic wrappings for the protection of steel pipelines	PSL
SANS 1123	2017	Pipe Flanges	PSL
SANS 1217	2015	Internal and external organic coating protection of buried steel pipelines	PSL
SANS 1294	2012	Precast concrete manhole sections and components	PS, PSL, PSG, PSLC, PSD, PSLE
SANS 1491 - 1 Super	2005	Portland cement extenders - Ground granulated blast furnace slag (GGBS)	PSG
SANS 1491 - 2 Super	2005	Portland cement extenders - Pulverised Fly Ash (PFA)	PSG
SANS 1491 - 3 Super		Portland cement extenders- Condensed Silica Fume (CSF)	PSG
SANS 1529		Mechanical Water meters - potable water	PSL
SANS 1551 - 1	2008	Check valves (flanged and wafer types) : Part 1: PN Series	PSL
SANS 1580	2005	Hexagonal steel wire mesh gabions andrevet mattresses	PSDK
SANS 1700-1 - 1	2010	Fasteners Part 1: Terminology and nomenclature Section 1: Bolts, screws, nuts and accessories	PSL, PSH, PSHA
SANS 1700-2 - 1	2003	Fasteners Part 2: Screw threads Section 1: ISO general purposes screw threads - Basic profile - Metric screw threads	PSL, PSH, PSHA
SANS 1700-4 - 1	2003	Fasteners Part 4: Tolerances Section 1: Tolerances for fasteners - Bolts, screws, studs and nuts - Product grades A, B and C	PSL, PSH, PSHA
SANS 1700-5 - 1	2011	Fasteners: Part 5: General requirements and mechanical properties: Section 1: Mechanical properties of fasteners made of carbon steel and alloy steel - Bolts, screws and studs	PSL, PSH, PSHA
SANS 1849	2008	Butterfly valves for general purposes	PSL

Specification	Year	Title	Applicable to:
SANS 1914	2002	Targeted Construction Procurement. Part 1 – Participation of targeted enterprises	CPG req
SANS 1921- 1 to 6		Construction and Management requirements for works standards and associated specification data	PS
SANS 1921 – 1	2018	Construction and Management Requirements for Works Contracts Part 1: General Employer's Agenting and Construction Works and where accommodation of traffic is involved	PS
SANS 1921 - 2	2018	Construction and Management Requirements for Works Contracts Part 2: Accommodation of Traffic on Public Roads Occupied by the Contractor	PS
SANS 1921 - 3	2018	Construction and Management Requirements for Works Contracts Part 3: Structural Steelwork	PS
SANS 1921 - 4	2018	Construction and Management Requirements for Works Contracts Part 4: Third party management support in works contracts	PS
SANS 1921 - 5	2004	Construction and Management Requirements for Works Contracts Part 3: Earthworks activities which are to be performed by hand	PS
SANS 1921 - 6	2004	Construction and Management Requirements for Works Contracts Part 6: HIV/AIDS Awareness	PS
SANS 6085		Testing of Concrete	PSG
SANS 4074	2003	Natural latex rubber condoms – Requirements and test methods	SANS 1921, PS
SANS 5772	2004	Preparation of steel substrates before the application of paints and related products – surface roughness characteristics of blast cleaned steel surfaces – Profile of blast cleaned surfaces determined by a micrometer profile gauge	PSL, PSH, PSHA, PA_Corrosion Protection
SANS 6085	2006	Concrete tests - Initial drying shrinkage and wetting expansion of concrete	PSG
SANS 10064	2011	The preparation of steel surfaces for coating	PA_Corrosion Protection
SANS 10104	1991	Handrailing and balustrading (safety aspects)	PS
SANS 10129	2006	Plastic tape wrapping of steel pipelines	PSL
SANS 10164-1	1980	The structural use of masonry Part 1: Unreinforced masonry walling	
SANS 10396	2003	Implementing Preferential Construction Procurement Policies using Targeted Procurement Procedures	PSL
SANS 50196 - 1&2	1994	Portland cement	PSG
SANS 50196 - 4	1993	Portland cement	PSG
SANS 50196 - 5	1994	Portland cement	PSG
SANS 50196 - 6&7	1989	Portland cement	PSG

Specification	Year	Title	Applicable to:
SANS 50196 - 1&2	1989	Portland cement	PSG
SANS 50413 - 1&2	1994	Portland cement	PSG
SANS 50196 - 3	1994	Portland cement	PSG
SANS 50197 - 1		Cementitious materials for concrete	PSG
SANS 50934 - 2	2009	Admixtures for concrete, mortar and grout: Part 2: Concrete admixtures, conformity, marking and labelling	PSG
SANS 50934 - 6	2011	Admixtures for concrete, mortar and grout Part 6: Sampling, conformity control and evaluation of conformity	PSG
SANS 51317 - 2	2009	Road restraint systems Part 2: Performance classes, impact test acceptance criteria and test methods for safety barriers.	PSMM, PS
SANS 53263 - 1	2011	Silica fume for concrete Part1: Definitions, requirements and conformity criteria	PSG
SANS 53263 - 2	2011	Silica fume for concrete Part 2: Conformity evaluation	PSG

APPLICABLE INTERNATIONAL AND OTHER STANDARD SPECIFICATIONS

The following additional standard specifications are relevant to in this contract and the Contractor is advised to obtain these from the relevant authorities:

Specification	Year	Title	Applicable to:
ANSI/API 5L: 44th edition		Specification for Line Pipe.	
API 1104: 20th edition		Welding of Pipelines and Related Facilities.	PSL
ASTM A234/A234M-11a		Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service	PSL
BS 10		Flange drilling patterns	PSL
BS 1200		Sand for plaster and mortar	PA_Brickwork
BS 1387		Non alloy steel tubes suitable for welding and threading	PSHA

Specification	Year	Title	Applicable to:
BS 1881:124	2015	Testing concrete: Methods for analysis of hardened concrete	PSG
BS 5135	1984	Specification for Arc welding of carbon and carbon manganese steels	PSG
BS 5155 Super	1984	Specification for butterfly valves	PSL
BS 534	1990	Steel pipes, joints and specials for water and sewage	PSL
BS 537		Specification for low carbon 17/12 chromium-nickel-molybdenum corrosion-resisting steel sheet and strip (500Mpa)	PSL
BS 4504		Flange drilling patterns	PSL
BS EN 593	2017	Industrial valves. Metallic butterfly valves for general purposes	PSL
BS EN 1092-1	2018	Flanges and their Joints – Circular flanges for pipes, valves, fittings and accessories, PN designated steel flanges	PSL
BS EN 10240	1998	Internal and or external protective coatings for steel tubes. Specification for hot dipped galvanized coatings applied in automatic plants	PSL, PA_Corrosion Protection
BS EN 10311	2005	Joints for the connection of steel tubes and fittings for the conveyance of water and other aqueous liquids	PSL
ISO 1456	2009	Metallic and other inorganic coatings - Electrodeposited coatings of nickel, nickel plus chromium, copper plus nickel and copper plus nickel plus chromium	PSL, PSH, PSHA
ISO 1458	2002	Metallic coatings: Electrodeposited	PSL, PSH, PSHA
ISO 1461	1999	Specifying hot dipped galvanising	PSL, PSH, PSHA
ISO 4074	2014	Natural rubber latex male condoms	SANS 1921, PS
ISO 4998	1996	Continuous hot dip zinc coated carbon steel sheet of structural quality	PSL, PSH, PSHA
ISO 8501-1	2007	Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness - Part1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings	PSL, PSH, PSHA

Specification	Year	Title	Applicable to:
ISO 8503-1	2012	Preparation of steel substrates before application of paints and related products - Surface preparation methods - Part1: General principles	PSL, PSH, PSHA
ISO 8504-1	2019	Preparation of steel substrates before application of paints and related products - Surface roughness characteristics of blast cleaned steel substrates - Part1: Specification and definitions for ISO surface profile comparators for the assessment of abrasive blast cleaned surfaces	PSL, PSH, PSHA
ISO 3575	2016	Continuous hot dip zinc coated carbon steel of commercial, lock forming and drawing grades	PSH, PSHA
ISO 14713-1	2017	Zinc coatings - guidelines and recommendations for the protection against corrosion of iron and steel in structures - Part1: General principles of design and corrosion resistance	PSH, PSHA
SIS 05 59 00	1967	Pictorial surface preparation standards for painting steel surfaces	PSHA

The variations to and additions to the standard specifications are included under the section named Amended Specifications and in some cases in the Particular Specifications. Such amendments take precedence over the Standard Specification as noted above.

Particular Specifications are included under section named Particular Specifications. Where a Particular Specification is in conflict with either the variations and additions to the standardised specifications or the Standardised Specifications listed, clarification shall be obtained from the Employer's Agent.

List of applicable Particular Specifications

SPEC PDA	QUALITY CONTROL AND ASSURANCE SYSTEMS
SPEC SDPDA	QUALITY CONTROL AND ASSURANCE SYSTEMS
SPEC PAM	HEALTH AND SAFETY SPECIFICATION
SPEC PEM	ENVIRONMENTAL MANAGEMENT
SPEC CVD	COVID 19 HEALTH & SAFETY SPECIFICATION

Amended Standard Specifications

SABS 1200

PSA GENERAL (SABS 1200 A – 1986)

PSA 2.3 DEFINITIONS

Replace the sub clause:

(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 Standardised Specifications, the Drawings or the Project Specifications. Specifications shall have the corresponding meaning."

(b) 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 amount or the Contract time of completion.

Time-related charge: A charge, the amount of which is varied in accordance with the time for completion of the work as adjusted in accordance with the provisions of the Contract.

Value-related charge: A charge, the amount of which is varied pro rata the final value of the measured work executed and valued in accordance with the provisions of the Contract."

PSA 3 MATERIALS

PSA 3.1 QUALITY

Add to the Sub-Clause:

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

PSA 3.3 STORAGE OF MATERIALS (NEW SUB-CLAUSE)

Add new Sub-clause:

The Contractor must make provision at his own expense for the proper storage of all materials in accordance with the manufacturer's recommendations. All cement must be stored in a rain proof and ventilated store and every precaution must be taken to keep it dry. 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. Valves need to be stored on hard surfaced areas, well off the surfaced area on pallets or similar, not in direct sun light.

PSA 3.4 ORDERING OF MATERIALS (NEW SUB-CLAUSE)

Add new Sub-Clause:

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 the 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 will be a Contractor's risk.

PSA 4 PLANT - CONDITION OF PLANT AND MACHINERY (NEW SUB-CLAUSE)

Add new Sub-Clause:

Any plant and machinery utilized on this Contract shall be in a 100% serviceable and roadworthy condition and shall be well maintained at all times. No plant and machinery shall be allowed to operate if it emits excessive noise, is smoking or is dripping oil. The Employer's Agent's instruction in this regard will be final.

No plant and machinery will be allowed to undergo scheduled services on site or at construction site offices. All scheduled services will be undertaken at the Contractor's workshops, away from the construction site. These workshops shall be operated in a legal manner whereby all Environmental and other applicable laws shall be upheld. No fuel, oil or grease shall be allowed to drain into soak pits or the storm water system without the required grease traps.

Refueling of plant and machinery on site shall take place in such a manner that no fuel is spilt at any stage of the operation.

The Contractor shall only utilize "self greasing" plant and equipment on site to ensure that no need exists to do regular greasing maintenance to plant and machinery on site.

Any unplanned spillage of fuels, grease and/or oil shall be attended to immediately in an appropriate manner.

The requirements of the EMP shall be adhered to at all times during construction.

PSA 4.2 CONTRACTOR'S OFFICES, STORES AND SERVICES

Delete the first sentence and add the following:

Neither housing nor shelters are to be made available for the Contractor's Employees on site, and the Contractor shall make his own arrangements if need be to transport the staff to and from site on a daily basis.

Refer to the requirements of the form of contract in this regard.

PSA 5 CONSTRUCTION
PSA 5.1 SURVEY

PSA 5.1.1 Setting Out of The Works

Add to Sub-Clause:

Prior to the commencement of any setting out the Contractor shall be responsible for verifying the correctness of the basic survey control points.

After clearing the site and before commencing any excavation work, the Contractor shall undertake a tachy survey with readings taken at a maximum grid spacing of 10 x 10 metres and shall include all feature lines.

The survey data must be in the format specified in the project specification and must be handed to the Employer's Agent at least 3 working days before the commencement of excavation or the construction of fill.

Monthly claim statements must be accompanied by detailed tachy survey data substantiating volume calculations.

PSA 5.1.2 Preservation and replacement of beacons and pegs subject to land survey act

Add to the Sub-Clause:

All survey reference marks that have been placed in the ground shall be clearly marked and protected by the erection of three fencing standards placed in a triangular formation around the reference peg.

PSA 5.9 COMPLETION OF WORKS (NEW SUB-CLAUSE)

Add new Sub-clause:

Upon completion of the Works, the Contractor shall restore and rehabilitate the site as required in terms of the Environmental Management Plan.

PSA 6 TOLERANCES
PSA 6.2 DEGREES OF ACCURACY

Add to Sub-clause:

Degree of Accuracy II shall be applicable to the whole of the works.

PSA 7 TESTING
PSA 7.1 PRINCIPLES

PSA 7.1.1 Checking

Add to Sub-Clause:

The Contractor shall provide the Employer's Agent with a minimum of 24 hours notice when a section of the Works is available for acceptance control testing and shall allow a further full working day for the processing of results.

PSA 7.2 APPROVED LABORATORIES

Add to Sub-Clause:

Materials testing may either be carried out in an approved commercial laboratory or in a dedicated site laboratory with sufficient suitable equipment to carry out all routine tests required by the Specifications and for carrying out any other tests which he may deem necessary for the proper quality control of the Works. SANAS registered laboratories are to be used.

PSA 7.3 METHODS OF TEST

Add to Sub-Clause:

Density control testing (Method A10(b) of TMH1) shall be carried out using an approved "nuclear" density testing machine (Troxler or similar approved). Density measurement shall be determined using Method C (Direct Transmission) for all layers including the crushed stone base. To this end, the Contractor shall use suitable equipment as necessary for the making of the hole for the probe of the nuclear device, without causing undue damage or stress to the surrounding layer. Method A - Flush Backscatter shall not be used. The Contractor shall also provide a suitably qualified materials tester who will be responsible for taking all samples, density control testing etc. required for his Process Control.

The Contractor is responsible for establishment of MODS for excavated material to be re used and stockpile control shall be such that specific material used at any specific location, can be traced back to origin and MOD determined.

PSA 7.5 SITE CONTROL AND ACCEPTANCE TESTING

Add new Sub-clause:

The onus rests on the Contractor to produce work which conforms in quality and accuracy of detail to the requirements of the specification and drawings, and the Contractor must, at his own expense, institute a quality control system and provide the necessary competent staff and equipment to ensure adequate supervision and positive control of the Works at all times.

The cost of process control, including testing, so carried out by the Contractor, shall be deemed to be included in the rates tendered for the relevant items of work. The results of the above test must be presented to the Employer's Agent upon request.

The Employer's Agent may at his discretion order acceptance testing by an independent approved laboratory. Where the tests reveal that the material used in the construction or the tolerance standard achieved does not comply with the applicable requirements of the specification, the costs of these check tests will be borne by the Contractor.

PSA 8 MEASUREMENT AND PAYMENT

PSA 8.2.1 Fixed charge and value related items

Delete Sub-Clause and replace with:

Each item should be priced separately and, subject to the Employer's Agent certifying in terms of Clause 6.7 of the General Conditions of Contract that the work has been done, payment will be made as follows:

- i. The total amount due when the certified value fixed charge items in this section is less than 5% of the net contract price.
- ii. When the certified value of fixed charge items in this section is greater than 5% of the net contract price, payment will be limited to 5% of the net contract price. The remainder will be paid when the value of the work done under the contract, excluding the value of fixed charge items in this section, is greater than 50% of the net contract price, excluding the value of fixed charge items in this section.

PSA 8.2.2 Time related items

Delete lines 3 and 4 and replace with:

....incremental amounts (calculated by the division of the remainder of the tendered sum by the number of remaining months of the duration of construction as assessed by the Employer's Agent) will be...

Add to the Sub-Clause:

Notwithstanding the provisions of Sub-Clause PSA 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 have become regarded as "time-related" items in terms of PSA 8.2.1 above.

PSA 8.4.6 Acceptance Testing

Add new Sub-Clause:

A commercial laboratory will carry out acceptance testing as and when directed by the Employer's Agent. (SANAS Registered)

The Contractor will be required to pay the laboratory in full for any testing carried out as directed by the Employer's Agent. These monies will be reimbursed to the Contractor should the tests be accepted.

The Contractor will still be required to carry out his own process control testing.

PSA 8.7 DAYWORKS

Add to Sub-Clause:

No work shall be measured on a daywork basis unless the Contractor has been instructed to do so by the Employer's Agent in writing. All work carried out on dayworks shall be recorded in detail on a daily basis. Dayworks plant and labour returns shall be submitted to the Employer's Agent daily for consideration and approval.

No transport costs to and from the site will be paid for plant removed from site at the Contractor's request or where such plant is listed in the Schedule of Plant and Equipment as available for this Contract.

PSA 8.8 TEMPORARY WORKS – DEALING WITH WATER ON WORKS

Add new Sub-Clause:

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

DRAFT DO NOT USE

PSAB EMPLOYER'S AGENT'S OFFICE (SABS 1200AB)

PSAB 3 MATERIALS

PSAB 3.2 OFFICE BUILDINGS

Add the following:

An office shall be provided for the Employers Agent with a separate office for the Employers Representative. Each office shall have a floor area of at least 40m² with an internal partition separating the office into a 12m² area for the Employer with the balance being available for two assistants, with similar configuration for the Employer.

In addition the offices shall be fitted with:

- a. Correctly sized air conditioning units.
- b. Refrigerator of 100l capacity
- c. 4 No 15 Amp earther power plug points reticulated within the offices for computer powering and other office equipment.
- d. An approved stand and holders for 20 vertically hung A0 drawings.
- e. An approved colour printer and scanner to print and scan A3 documents adequate printer cartridges shall be provided throughout the contract duration
- f. An approved colour printer and scanner capable of printing and scanning A1 sized drawings, printer cartridges/toner shall be provided.
- g. A lockable cabinet
- h. 3 desks and 3 chairs
- i. A drawing table shall be supplied to each office, capable of spreading an A0 drawing satisfactorily.
- j. Boardroom facilities for 15 people, with air conditioning shall be provided.

5 carports shall be provided for exclusive use of the Employers Agent and the Employer. The carports shall have suitable roof cladding and be covered on 3 sides

PSAB 4.1 TELEPHONE

Add to sub clause:

Time Related charges of R1500 per month shall be included for airtime for use by the Employer's Agent for the duration of the Contract.

A wireless internet service is to be provided at the site offices with uncapped data access per month for Employers Agent and Employer's use.

PSAB 5 CONSTRUCTION

PSAB 5.5 SURVEY ASSISTANTS

Delete the first sentence and substitute the following:

Survey assistants are to be made available to the Employer's Agent when required.

PSAB 5.6 SURVEY EQUIPMENT (NEW SUB-CLAUSE)

Add new Sub-Clause:

The Contractor shall provide the following survey equipment on the site as and when required by the Employer's Agent:

- 1 No. Automatic Level (Leica 728) with aluminum tripod (Leica GST05L)
- 1No. Leica CLR102 Telescopic 5M , 4 section Levelling staff
- 1 No. Staff Angle Bubble
- 1 No. 2KG Hammer
- 1 No. Plumb bob
- 1No. Metal Change points
- 1No. 30m Reinforced Glass Fibre Tape
- 1 No. Leica D3 Laser Distance meter (Instead of a 5 M retractable steel tape)
- 1 No. Elcometer 456 Coating Thickness Gauge

PSC SITE CLEARANCE (SABS 1200 C – 1980 as amended 1982)

PSC 3 MATERIALS

PSC 3.1 DISPOSAL OF MATERIALS

Add the following:

The free haul distance for this contract is unlimited.

Contractors are to note that no overhaul will be paid. Material obtained from clearing must be disposed of offsite by the Contractor at his expense. The Contractor will be held responsible for observing the by-laws and regulations of the relevant local authority. Burning of combustible material shall not be allowed.

The requirements of the EMP are to be met at all times.

PSC 5 CONSTRUCTION

PSC 5.1 AREAS TO BE CLEARED AND GRUBBED

Add to Sub-Clause:

The Employer wishes to control and limit erosion as well as preserve the existing natural bush and trees as far as possible. The areas to be cleared must be kept to a minimum but be such as not to affect the quality of the work and hamper the efficient execution of the Contract. The Contractor shall also take all necessary precautions to protect the existing fauna and flora during clearing and construction operations.

The Employer's Agent reserves the right to order manual clearing and grubbing should the conditions warrant this.

PSC 5.3 CLEARING

Add to the Sub-Clause:

Where pipes are to be laid the Contractor shall be allowed to clear and grub the construction corridor for the maximum width of the allowed working space corridor width as specified. No construction activities may be undertaken outside the construction corridor demarcated by the temporary fencing to be erected.

All trees with a girth more than 250 mm or a height of more than 2,5m within this strip, shall be protected and may only be trimmed or removed after a written order by the Employer's Agent.

No site clearance activities shall commence before the issuing of an "Access Certificate" by the Employer's Agent. Such "access certificate" is not the same as "provision of access" as required by the Conditions of Contract. It merely indicates that the Employer's Agent has verified that preconditions for work in the proposed work area may commence as preconditions have been met.

The tendered rates for site clearance shall be deemed to include for the removal of waste from site and the disposal thereof.

With reference to SABS 1200 C clauses 5.3 and 5.4 and 8.2.1, payment will be made for clearing and grubbing only where required and to an extent that will enable excavation of trenches to proceed and not necessarily along the entire length of the pipeline. Disturbance of vegetation and roots should as far as possible be confined to the width of the trench, except that vegetation may be cut back to provide reasonable access and working space, without destroying the potential for re-growth.

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 8 MEASUREMENT AND PAYMENT

PSC 8.2.1 Clear and Grub

Replace the first line with the following:

The area designated by the Employer's Agent to be cleared and grubbed will be measured in square metre to the nearest square metre or,

The unit of measurement shall be square metre (m²).

PSC 8.2.5 Take down existing fences

Add to the Sub-Clause:

The unit of measurement shall be metre (m).

The tendered rate shall include for storing and reinstatement of the fence as directed by Employer's Agent on site.

PSC 8.2.7 Dismantle and Remove Existing Services

Add to the Sub-Clause:

The unit of measurement shall be metre (m).

The tendered rate shall include for stockpiling of dismantled services for returning to the Employers depots, where required.

The rate for removal of asbestos Cement pipelines shall cover the cost of the cutting of the existing pipe, dismantling, lifting and stockpiling in accordance to Construction Regulations, 2014, Asbestos Regulations, 2001 and Environmental Management Plan, PEM 5.11 Hazardous Waste.

PSC 8.2.8 Demolish and remove existing structures/buildings

Add to the Sub-Clause:

The tendered rate shall include transporting rubble to an approved spoil site.

The unit of measurement shall be metre (m³).

PSC 8.2.10 Remove topsoil to stockpile

Add to the Sub-Clause:

The unit of measurement shall be cubic metre (m³).

The tendered rate shall include full compensation for removing topsoil to a depth of 150mm for the maximum width of the allowed working space corridor width. and for loading and transporting the material to and from a stockpile in the vicinity of the site of works. No indiscriminate clearing and spoiling shall be allowed. Replacing after backfilling shall be the even spreading of topsoil over the entire surface area where it was removed, to a uniform depth over the entire surface area.

Where topsoil conditions allow for removal more than 150mm deep, the Employer's Agent may instruct accordingly up to a depth of 300mm.

PSC 8.2.11 Saw Cutting of Existing Asphalt Surface (New Sub-Clause)

Add new Sub-Clause:

The unit of measurement shall be metre (m).

The unit of measure shall be the linear metre of the asphalt cut according to the plans or as instructed by the Employer's Agent. The rate shall include for the supply of an approved asphalt saw cutting machine and all other necessary equipment for saw cutting of asphalt, according to the specification which calls for a double cut on each side of the excavation if required.

PSC 8.2.12 Saw Cutting of Existing Concrete (New Sub-Clause)

Add new Sub-Clause:

The unit of measurement shall be metre (m).

The unit of measure shall be the linear metre of the concrete cut according to the plans or as instructed by the Employer's Agent. The rate shall include for the supply of an approved asphalt saw cutting machine and all other necessary equipment for saw cutting of concrete, according to the specification which calls for a single cut.

PSC 8.2.13 Remove Existing Road Asphalt Surfacing to Spoil (New Sub-Clause)

Add new Sub-Clause:

The unit of measurement shall be square metre (m²).

The rate shall cover the cost of removing, loading, transporting and disposal to spoil of all asphalt surfacing as instructed by the Employer's Agent. The rate shall take into account that this work may have to be carried out in more than one operation depending on the Construction programme and traffic accommodation.

PSC 8.2.14 Remove Existing Gravel Layer works to Spoil (New Sub-Clause)

Add new Sub-Clause:

The unit of measurement shall be cubic metre (m³).

The rate shall include for the selective removal of existing gravel layer works to the required depth as instructed by the Employer's Agent, loading and transporting to spoil as per Clause PSC 3.1:
Disposal of Material. The rate shall take into account that this work will have to be carried out in more than one operation depending on the construction programme and traffic accommodation.

PSC 8.2.15 Remove Existing Concrete Surfacing to Spoil (New Sub-Clause)

Add new Sub-Clause:

The unit of measurement shall be square metre (m²).

The rate shall cover the cost of removing, loading, transporting and disposal to spoil of all concrete surfacing as instructed by Employer's Agent. The rate shall take into account that this work may have to be carried out in more than one operation depending on the Construction programme and traffic accommodation.

PSC 8.2.16 Remove along edges of road and footway (New Sub-Clause)

Add new Sub-Clause:

The unit of measurement shall be metre length (m).

The rate shall include the removal of the concrete kerbing and associated concrete backing, loading, transporting and disposal to spoil sites selected by the Contractor and approved by the Employer's Agent.

PSC 8.2.17 Dismantle, Storing and Re-Erection of Road Signs

Add new Sub-Clause:

The unit of measurement shall be number (No).

- a) Exceeding but not exceeding surface area of: 0 - 2,0m²

The unit of measure shall be the number of road signs dismantled, stored and re-erected as instructed by the Employer's Agent.

The rate shall include the cost of dismantling and re-erection of all components of the road sign, the transporting to and from storage, all costs associated with the storage of the road signs, all labour costs involved in the process of dismantling and re-erection and the backfilling, shaping and trimming of any sign post holes.

PSC 8.2.18 Remove Existing Concrete Kerbing & Channelling

Add new Sub-Clause:

The unit of measurement shall be metre (m).

The rate shall cover the cost of removing, loading, transporting and disposal to spoil of all concrete kerbing and channelling as instructed by Employer's Agent. The rate shall take into account that this work may have to be carried out in more than one operation depending on the Construction programme and traffic accommodation.

PSD EARTHWORKS (SABS 1200 D – 1988 as amended 1990)

PSD 2 INTERPRETATIONS

PSD 2.1.2 Supporting Specifications

Delete Sub-Clause and replace with:

Any of the other SABS 1200 Specifications (latest editions) may form part of the Contract Documents.

PSD 2.3 DEFINITIONS

Delete the sentence under **Borrow** and replace with:

Borrow: Material, other than material obtained from excavations required for the Works, obtained from sources such as borrow pits or the authorised widening of excavations. 'Borrow' shall have a corresponding meaning.

Delete the sentence under **Restricted Excavation** and replace with:

Restricted excavation - An excavation so restricted in area or width as to preclude removal of material by excavating machinery used for bulk excavation measured in terms of Sub-Clause 8.3.2. Restricted excavation may be carried out by smaller machinery or by hand, as selected by the Contractor. The extent of restricted excavation shall be as scheduled and/or shown on the drawings. All other excavation shall be regarded as bulk excavation.

Delete the sentence under **Specified Density** and replace with:

Specified density: The specified dry density expressed as a percentage of modified AASHTO dry density.

Delete the sentence under **Stockpile** and replace with:

Stockpile (Verb): The process of selecting and as may be necessary, loading, transporting and offloading material in a designated area for later use and a specific purpose.

Add the following definitions:

Fill: An embankment or terrace constructed from material obtained from excavations or borrow. In roads it includes the earthworks up to the underside of the selected subgrade level.

Fill (material): Material used for the construction of an embankment or terrace.

Roadbed: The natural in situ material on which the fill, or in the absence of fill, any pavement layers, are to be constructed.

PSD 3 MATERIALS

PSD 3.1 CLASSIFICATION

Delete Clause 3.1 and replace with the following:

Classification of Excavation

For the purpose of measurement and payment excavated material shall be classified under the following three headings:

Rock

Rock shall be held to be undecomposed boulders exceeding 0,2m³ in volume and solid rock occurring in bulk, banks or ledges, the excavation of which would normally necessitate the use of explosives and shall have a total rating in excess of 75, as defined in the following Table. In addition, when tested with Type L Schmidt hammer, the rock shall have a rebound value above 30, when tested vertically downwards.

Hard Material

Hard material shall be held to be the material other than rock which needs to be loosened by pneumatic, hydraulic or mechanical breakers prior to being excavated and shall have a total rating between 25-75 as defined in the following Table. In addition, when tested with a Type L Schmidt hammer, it shall have a rebound value in the range 5-30 when tested vertically downwards.

Soft Material

Soft material will be held to be material not falling into the categories of rock and hard material such as gravel, earth, sand, silt, clay and completely weathered rock and shall have a total rating less the 25 as defined in the following Table. In addition, when tested with a Type L Schmidt hammer, It shall have a rebound value less than 5 when tested vertically downwards.

Table 1: Rock Classification

CLASS	I	II	I	IV	V
Description	Very Good Rock	Good Rock	Fair Rock	Poor Rock	Very Poor Rock
Seismic Velocity (m/s)	>>2 150	2 150-1 850	1 850-1 500	1 500-1 200	1 200-450
Rating	26	24	20	12	5
Rock Hardness Rating	Extremely Hard 10	Very hard 5	Hard 2	Soft 1	Very soft 0
Rock Weathering Rating	Un weathered 9	Slightly Weathered 7	Weathered 5	Highly Weathered 3	Completely Weathered 1
Joint Spacing (mm) Rating	>>3 000 30	3 000-1 000 25	1 000-300 20	300-50 10	<<50 5
Joint Continuity Rating	Non Continuous 5	Slightly Continuous 5	Continuous -no gouge 3	Continuous Some gouge 0	Continuous With gouge 0
Joint Gouge Rating	No Separation 5	Slight Separation 5	Separation <<1mm 4	Gouge <<5mm 3	Gouge >>5mm 1
Strike and Dip Orientation Rating	Very Unfavourable 15	Unfavourable 13	Slight Unfavourable 10	Favourable 5	Very Favourable 3
Total Rating	100-90	90-70	70-50	50-25	<25

PSD 3.1.3 General

Add new Sub-Clause:

The method of excavation shall be at the discretion of the Contractor provided that the work complies with the specification and the following requirements:

- Excavations shall be confined within the limits defined by the drawings or as instructed by the Employer's Agent.
- Surfaces in excavations shall at all times be formed to shed stormwater and groundwater without ponding.
- where excavation is accomplished by blasting and the material is required for fill, sufficient fragmentation shall be attained to allow the material to be used as fill; and
- excavated faces in abandoned borrow shall be formed to stable slopes.

Since borrow sites are usually required for future development, the Contractor shall not excavate haphazardly and strict level control shall be maintained at all times. Site design levels will be supplied to the Contractor and he shall ensure that these levels are strictly adhered to. Where topsoil is to be removed prior to excavation this will be considered a separate operation and will be measured as such.

The Contractor or his representative shall jointly with the Employer's Agent keep a record of the depths, dimensions and classification of excavation as defined in clause PSD 3.1.

PSD 3.1.4 Overbreak

Add new Sub-Clause

Excavation carried out in excess of the specified depth, unless authorised by the Employer's Agent, shall be made up with concrete class 15/26 or other approved material, as directed by the Employer's Agent, at the Contractor's expense.

Where the sides of foundations are specified on the drawings as being cast against in-situ ground, the excavations shall be carried out to the neat dimensions of the base and any overbreak shall be backfilled with the same class of concrete as that in the base or with mass concrete fill as specified or directed by the Employer's Agent.

Where the bottoms or sides of excavations, against which concrete is to be cast, are softened due to rain or other causes the softened material shall be removed and replaced by concrete or other approved material as directed by the Employer's Agent at the Contractor's expense provided always that the material forming the sides of the excavation is initially capable of standing unsupported at the required slope.

PSD 3.2 CLASSIFICATION FOR PLACING PURPOSES

PSD 3.2.1 Material Suitable for Embankments and Terraces

Delete the Sub-Clause and replace with **SABS 1200DA 3.2.1, GENERAL**, with the following modifications:

In the first sentence delete "150mm" and substitute with "100mm"

Add to Sub-Clause:

The material for the embankments shall be compacted to 95% modified AASHTO density.

PSD 3.2.2 Material Suitable for Replacing Overbreak In Excavation for Foundations

Delete Sub-clause and replace with:

Excavation carried out in excess of the specified depth, unless shown on the drawings or authorised by the Employer's Agent, shall be made up with concrete class 15/19 or other approved material, as directed by the Employer's Agent, at the Contractor's expense.

Where the sides of foundations are specified on the drawings as being cast against in-situ ground, the excavations shall be carried out to the neat dimensions of the base and any overbreak shall be backfilled with the same class of concrete as that in the base or with mass concrete fill as specified or directed by the Employer's Agent.

Where the bottoms or sides of excavations, against which concrete is to be cast, are softened due to rain or other causes. The softened material shall be removed and replaced by concrete or other approved material as directed by the Employer's Agent at the Contractor's expense provided always that the material forming the sides of the excavation is initially capable of standing unsupported at the required slope.

PSD 3.3 SELECTION

PSD 3.3.1 General

Delete Sub-Clause and replace with:

All topsoil requires to be conserved for this Contract. Topsoil shall be preserved by stockpiling for later use and be re-spread over the area where removal took place. The requirements of the EMP are to be met at all times.

PSD 3.3.3 Stockpile Sites

Add new Sub-Clause:

Stockpile sites shall be prepared by clearing and light grading. The contractor shall ensure that windblown sand will be kept to a minimum so as not to constitute a public nuisance.

PSD 3.3.4 Selection in borrow pits and excavations

Add new Sub-Clause:

The approval of a borrow area for a certain purpose does not necessarily mean that all material within that area is suitable for the specified purpose. What it does mean, is that the borrow area contains some suitable material. The onus is on the Contractor to ensure that only material that is deemed suitable, is removed and used for the specified purpose.

Where the Contractor is required to select material from excavations for a specific purpose, the above provisions relating to borrow areas shall apply mutatis mutandis to excavations.

The Contractor shall not waste or contaminate material that has been selected for a specific purpose.

PSD 4 PLANT

PSD 4.1 GENERAL

Replace clause 4.1. with the following:

In general, the Contractor may use whatever plant he considers appropriate to construct the work to required specification.

In the case of backfill against structures, however, no earthmoving equipment with a mass exceeding 1 000 kg shall be used within a zone of restricted placing, normally within 2,5m of any concrete face, unless otherwise specified.

PSD 5 CONSTRUCTION

PSD 5.1 PRECAUTIONS

PSD 5.1.1.1 Barricading and Lighting

Change heading to read: **BARRICADING/FENCING, LIGHTING, SIGNS AND ACCESS**

Delete Sub-Clause and replace with:

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 are adjacent to a public road or thoroughfare, or by which the safety of persons may be endangered, are protected as set out in Clause 13 of the General Safety Regulations of the Occupational Health and Safety Act, 1993. The Contractor shall employ watchmen who are to ensure that barricades, barriers and lights are effective at all times. The Contractor shall, for this purpose, have at its disposal a 24 hour response team that can react to public complaints in this regard or to calls from the watchmen who are employed to ensure effective barricades, barriers and lights at all times.

Barricades are grouped into different categories:

1.a Barrier Fences without electrical fence –

Barrier Fences shall consist of 1.8m high Bonox type or similar approved fence type, of such configuration that animals cannot enter through the bottom section of the fence and that human beings cannot have free access. This barrier fence shall be supported with full length vertical droppers at intervals of 3 metres and Y standard stakes planted into the ground at intervals of 12 metres. Barrier fences shall typically be required in areas where work fronts are situated in farmland, small holdings and other areas where agricultural activities are prevalent. Barrier Fences shall be erected alongside the working corridor on both sides for the full length of the working front as instructed by the Employer's Agent.

1b. Barrier Fences with electrical fence –

Barrier Fences shall consist of 1.8m high Bonox type or similar approved fence type, of such configuration that animals cannot enter through the bottom section of the fence and that human beings cannot have free access. This barrier fence shall be supported with full length vertical droppers at intervals of 3 metres and Y standard stakes planted into the ground at intervals of 12 metres with 20 strand electrical fence to the outside of the property. Also, facing the Barrier fences shall typically be required in areas where work fronts are situated in farmland, small holdings and other areas where agricultural activities are prevalent. Barrier Fences shall be erected alongside the working corridor on both sides for the full length of the working front as instructed by the Employer's Agent.

2.a. Rigid Barricades for noise reduction 1.8m high –

Rigid Barricades for noise reduction shall consist of 1.8m high barricading constructed out of smooth solid material, which will bounce off noise waves as well as disabling seeing into the area being barricaded. The Barricade structure shall be rigidly fixed to the ground to prevent access and it being blown over by wind. Rigid Barricades for noise reduction shall typically be required in areas where construction noise poses an annoyance in built up areas. Rigid Barricades for noise reduction shall be erected as instructed by the Employer's Agent.

2.b. Rigid Barricades for noise reduction 3m high –

Rigid Barricades for noise reduction shall consist of 3m high barricading constructed out of smooth solid material, which will bounce off noise waves as well as disabling seeing into the area being barricaded. The Barricade structure shall be rigidly fixed to the ground to prevent access and it being blown over by wind. Rigid Barricades for noise reduction shall typically be required in areas where construction noise poses an annoyance in built up areas. Rigid Barricades for noise reduction shall be erected as instructed by the Employer's Agent.

3. Rigid Barricades for preventing access –

Rigid Barricades for preventing access, shall be of interlocking modular type, 1.8m high, with a barricade face of at least a Bonox type or similar approved fence type. The barricade shall be capable of being secured to the ground to prevent it from falling over, being bumped over or blown over by the wind. The bottom section of the fence type shall be such that animals cannot get through. Red and white danger tape shall be woven through the fence in order to increase visibility and the tape shall be secured in order to prevent loose ends from flapping in the wind or lying on the ground. Rigid Barricades for preventing access shall typically be required around excavations in road reserves where there is no danger of passing traffic driving into such excavations. Rigid Barricades for preventing access shall be erected as instructed by the Employer's Agent.

4. Rigid Barricades for preventing access and visibility –

Rigid Barricades for preventing access and visibility shall be of the same construction as the Rigid Barricades for preventing access, with the provision that 80% density black shade cloth which is well secured to the fence, shall block out visibility into work areas where same is required. Rigid Barricades for preventing access and visibility shall be erected as instructed by the Employer's Agent.

5. Barricades of Armco type or similar approved, fitted into Tarmac surfaces –

This type of barricade shall consist of the Armco type barrier, fitted to 200mm wooden posts at 3000mm centres, planted 800mm deep into the road surface. The holes for the wooden posts shall be augered in order to limit overbreak. Compaction of the posts shall be with a material similar to the specified pipe bedding which can be hydraulically compacted to 100% MOD AASHTO. Upon removal of the wooden posts, the post holes shall be backfilled with a material similar to the specified pipe bedding which can be hydraulically compacted to 100% MOD AASHTO and compaction shall be 100% MOD AASHTO. The final 300mm layer of backfill, onto which the wearing course will be laid, shall consist of G2 material compacted to 97% MOD AASHTO. Barricades of Armco type or similar approved, fitted into Tarmac surfaces shall be erected as instructed by the Employer's Agent.

6. New Jersey type barriers or similar approved –

This type of barrier shall be typical of the standard New Jersey concrete barrier or similar approved and shall be erected as instructed by the Employer's Agent. The barriers shall be adequate for containment level H2 as specified in SANS 51317 -2:2009 Part 2.

7. Opaque Screen Barrier Fences –

Barrier Fences shall consist of 1.8m high Bonox type or similar approved fence type, of such configuration that animals cannot enter through the bottom section of the fence and that human beings cannot have free access. This barrier fence shall be supported with full length vertical droppers at intervals of 3 metres and Y standard stakes planted into the ground at intervals of 12 metres. The fence shall be fitted with 80% density black shade cloth in order to limit visibility. Barrier fences shall typically be required in areas where work fronts are situated in

farmland, small holdings and other areas where agricultural activities are prevalent and visibility into the working corridor is to be limited.

No access into any barricaded area shall be allowed to anybody other than construction workers and representatives of the Employer's Agent who have undergone a site induction course. At each barricaded work front, an authorised person, qualified to un-lock the system, or in the case of Barrier Fences or Rigid Barricades for noise reduction, opening a special gate in the fence or barricade, to grant access to staff, shall be deployed. In the cases where different types of barricades are utilised in conjunction with each other, for example a New Jersey barrier on the one side of the excavation and a Rigid Barricade for preventing access on the other, the ends where transition from one to the other takes place, shall be adequately closed off with suitable barrier type as instructed by the Employer's Agents. The Contractor shall ensure that access at ends where vehicles have to enter and exit, are controlled.

Access ramps for vehicles and/or pedestrians shall be provided along the route of the work for the purpose of providing access. Suitable barricading and handrails shall be provided for these access ramps. 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 of the local roads authority.

General

The tendered rates for barricading shall include the supply, erection, maintenance and relocation of barricading and barriers as required by the Employer's Agent. The requirement to utilise bollards and or traffic cones or any other equipment in order to manage traffic flow and movements, which are not measured as barricades, shall be priced for under the relevant activities and all rates tendered for these activities shall be deemed to include for the use of same.

Where access by property owners is required, through barricaded areas, such access shall be arranged through setting up barricading in such a manner that access to property is possible without access to work areas which requires barricading. All tendered rates for barricading shall be deemed to include for such protected access by property owners.

Although a range of barricades are defined above, the Contract might only require specific types for which items have been allowed for in the Bill of Quantities.

PSD 5.1.1 Safety

Add to Sub-Clause:

All activities shall be carried out in accordance with the requirements of the relevant clause of the Occupational Health and Safety Act (Act 85 of 1993).

PSD 5.1.1.2 Safeguarding of Excavations

Delete the first three lines and substitute the following:

The Contractor or his Agent or Representative appointed in writing shall be deemed to be a person who is competent to pronounce on the safety of all bracing and shoring as set out in the Occupational Health and Safety Act (Act 85 of 1993).

Add to the Sub-Clause:

The Contractor shall provide additional lateral support for all buildings, structures and services affected by his operations as required and deemed to be applicable.

The relevant sums tendered for trenching in the Bill of Quantities shall cover the cost of providing, installing, maintaining and removing lateral support that is adequate for preserving the stability of the existing fences, walls, buildings, structures and services and shall include for productivity rates applicable to a construction process including the deployment of mechanisms require to safeguard excavations.

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 Explosives

Add to Sub-Clause:

Blasting shall not be carried out without the prior consent of the Employer's Agent. This consent will not be given where in the opinion of the Employer's Agent, blasting may give rise to unnecessary risk or damage to surrounding property when other means of excavation are available to the Contractor. Where consent to blasting is given, such consent shall in no way relieve the Contractor of any of his liabilities under the contract.

The Employer's Agent shall be notified at least 72 hours beforehand of the Contractor's intention to use explosives on site.

It shall be incumbent on the Contractor to make himself aware of restrictions to blasting imposed by electric transmission or telephonic lines, fuel pipelines, or other similar services.

Where the presence and location of such services are known or are shown on the drawings at tender stage the Contractor must make allowance in his rates and programme for restrictions and delays which may result from the restrictions imposed by the relevant authorities.

PSD 5.1.1.4 Use of Explosives

Add new Sub-Clause:

Generally, the Contractor shall 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 Employer's Agent or Inspector of Explosives shall have the power to prohibit the use of explosives in cases where in his opinion, the risks of injury to persons or damage to property or adjoining structures or services are too high. Such action by the Employer's Agent 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 Special Conditions or Bill of Quantities.
- b) Should blasting be necessary, the Contractor shall take every precaution to protect the Works, persons, animals and property in the vicinity of the site. The Contractor shall 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 latest requirements of 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 Employer's Agent shall be complied with. All explosives handling, storage and blasting operations to be in accordance OHS Act, Explosives Regulations, Government Gazette No. 2472

- 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 supplied to the Employer's Agent. The Contractor shall grant the Employer's Agent access to all records maintained for the Inspector of Explosives or the Government Mining Employer's Agent, as the case may be.
- e) Blasting Near Dwellings/Installations/Services
 - i). Before any blasting is undertaken, the Contractor, together with the Employer's Agent, 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 any cracking or damage that may exist before commencement of blasting operations. It is recommended that a detailed photographic record of neighbouring structures be taken before blasting commences. It will 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.
 - ii). Where there is reasonable danger of damage (structural, electrical or mechanical) to adjacent reservoirs and associated structures, power and telephone lines, fuel pipelines, or any other property, the Contractor shall suitably adapt his methods of blasting, the size of charges, and use adequate protective measures to ensure that no damage occurs.
- f) The Contractor is to submit to the Employer's Agent for approval a professional report on the proposed method of blasting to be adopted for the works.
- g) During the initial blasting on site the Employer's Agent shall arrange for a survey to be carried out in order to monitor the magnitude of the blast vibrations and to establish the most vibration sensitive point on the perimeter of the site. Should it be required, the Contractor shall modify the adopted method of blasting as instructed by the Employer's Agent.
- h) For every blast carried out on site the Contractor shall provide three vibro-recorders and a peak particle velocity meter. Calibration certificates are to be supplied to the Employer's Agent prior to commencing blasting on site. The Employer's Agent shall arrange for random checking of the calibration of such instruments.
- i) The Contractor shall keep full records of every blast on site, e.g. number, depth and size of holes, amount and type of explosive used per hole, number of blasts at any one time, magnitude of recorded vibrations etc., a copy of which is to be forwarded to the Employer's Agent.
- j) All blast surfaces are to be covered with mats and/or a suitable thickness of soft cover material all to the satisfaction of the Employer's Agent.
- k) For every blast carried out on site, the Contractor shall cover the Cordtex etc., with soft sandy material to dampen the noise levels of the blast all to the satisfaction of the Employer's Agent.
- l) The maximum allowable peak particle velocity measured at any point 10m from the nearest structure to the blast shall not exceed 25mm/sec. The fact that peak particle velocity has been stated in this clause does not mean that the Contractor should accept this as the minimum requirement at all times. Should circumstances require a reduced peak particle velocity from that stated above, to ensure a safe environment from blasting, the Contractor shall adjust his blasts according to requirements.
- m) When blasting to specified profiles, the Contractor shall so arrange the holes and charges that the resulting exposed surfaces are as sound as the nature of the material permits. The Contractor shall make good at his own expense any additional excavation necessitated by the shattering of rock in excess of any over break allowance specified in the Special Conditions or any other specification given on a drawing.

The Contractor shall include for all costs in complying with the above requirements/ conditions in the tendered rates for excavation.

Notwithstanding any of the requirements of the Specifications the Contractor will be required to carry out a sufficient number of test blasts (minimum 3), each comprising of a maximum number of 9 holes charged with small charges, in order to ascertain the attenuation effects of the in-situ material and to satisfy both himself and the Employer's Agent that the proposed methods of blasting will not damage any existing services and/or dwellings and structures.

All persons occupying property in the vicinity of a proposed blast shall be informed in writing at least 72 hours before the first blast and shall be informed of the warning procedures to be employed. In addition, before any blasting is carried out, the Contractor shall notify the local Police in writing of proposed operations, the warning procedures to be employed, and the anticipated duration of the blasting operations.

Immediately prior to blasting, all approaches to the area shall be guarded by personnel carrying red warning flags.

PSD 5.1.1.5 Negligence

Add new Sub-Clause:

The Contractor shall be liable for all damages to property or services caused as a result of blasting.

PSD 5.1.3 Stormwater and Groundwater

Delete the second sentence and substitute:

Foundation excavations for structures shall be kept free of water at all times until they have been inspected and approved and the concrete substructures, together with their related superstructures, have been completed.

PSD 5.2 METHODS AND PROCEDURES

The plant used for applying the dynamic load, controlling the moisture content and grading or mixing shall be capable of achieving the compaction specified using the materials available for the construction of the Works.

PSD 5.2.1 Site Preparation

PSD 5.2.1.1 Clearing of and stripping of site

Delete the last sentence of (b) and substitute:

"Material so removed shall be disposed of by the Contractor to approved sites in terms of the Environmental Management Plan".

PSD 5.2.1.2 Conservation of Topsoil

Add to the Sub-Clause:

All topsoil suitable for re-use shall be transported directly to the stockpile area and placed separately from all other materials in order to avoid contamination. All stockpiles are to be managed in terms of acceptable environmental management practises.

PSD 5.2.2 Excavation

PSD 5.2.2.1 Excavation for General Earthworks and Structures

Add to the Sub-Clause:

No concrete or other material shall be built or otherwise placed in the foundation pits until they have been cleaned, inspected and passed by the Employer's Agent. The bottom of the excavation must be compacted to at least 95% Mod. AASHTO density provided that the material in itself is capable of being so compacted and the excavation must be kept free of water at all times.

Where the material at the founding level is soft material, or hard material which deteriorates rapidly on exposure, excavation to final level shall not be made until just before the Contractor is ready to place the blinding layer.

Immediately after the material at founding level has been approved and before it is built upon, levels shall be taken and compared by the representatives of the Contractor and the Employer's Agent. Any disagreement is to be checked immediately while it is still possible to do so.

Excavated and stockpiled material shall be deposited so as not to endanger the uncompleted structure either by direct pressure or indirectly by overloading the banks adjacent to the structure or in any other way. The Contractor shall not spoil, waste or stockpile excavated material without the approval of the Employer's Agent.

Where outside shuttering is ordered by the Employer's Agent, the excavations shall be carried out for an extra width of not more than 500mm all around the structure, measured from the base of the face to be shuttered, to allow for working space for the shuttering to be fixed.

Payment for excavations shall be measured nett. Over break, or allowance by the Contractor for battered slopes, shall not be measured for payment purposes.

Outside shuttering shall be used for the construction of all major structures unless ordered otherwise by the Employer's Agent.

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 10mm protruding into the excavation profile.

Material for earthworks shall be obtained from borrow pits only on instructions from the Employer's Agent. In order to avoid the necessity to dispose of surplus material, every endeavour must be made to use the in-situ material in cuttings as earthworks fill material and even as lower selected material where suitable.

PSD 5.2.2.5 Benching

Add new Sub-Clause:

The requirements of Sub-Clause 5.2.4.1 (b) of SABS 1200 DM shall apply.

PSD 5.2.3 Placing and Compaction

PSD 5.2.3.1 Embankments

Delete the word "90%" and replace with "93%"

Add the following:

Before any placing of fill commences, preparatory work such as site clearing, fencing (where required), and the removal of topsoil and unsuitable ground shall be completed. All drainage structures and culverts shall also be installed unless agreed otherwise by the Employer's Agent. Where the height of fill is 1,0m or less, the natural ground shall be compacted to 95% Mod. A.A.S.H.T.O., before filling commences and where the fill height if greater than 1m compaction shall be to 95% Mod. AASHTO to a depth of at least 150mm in both cases.

Bonding

- If the natural ground crossfall is greater than 5% the entire interface between the embankment and the natural ground shall be bonded by scarifying to a depth of 150mm.
- The thickness of any one layer of fill up to 1m below formation level shall not exceed 150mm after compaction using static rollers, or 300mm using vibrating rollers.
- The top 1m layer of fill below formation shall be carried out in layers not exceeding 150mm thickness.

The standard of compaction required shall be-

- Up to 1m below formation level, 95% Mod. AASHTO. Density.
- The top 1m layer below formation, 95% Mod. AASHTO density.
- The moisture content during compaction of the top 1m layer below formation as determined by the Modified AASHTO compaction test shall be optimum $\pm 2\%$.
- After compaction, the layer shall be proof rolled with a vehicle having a minimum wheel load of 20kN in order to determine any soft spots.
- Any layer which becomes soft after being compacted and tested, shall be recompacted to the specified density at the Contractor's expense.
- All stones, lumps, etc. shall be broken down to conform to a maximum dimension not exceeding two-thirds of the specified compacted thickness of the layer.
- Placing of Fill on Swampy Ground – On swampy ground and at other problem areas but not around structures, the Employer's Agent may permit the pioneering of the embankment by end dumping or bulldozing, but only to the minimum extent necessary to develop adequate facilities for normal placing.
- The side slopes shall be trimmed to a plane surface free from loose material and stones larger than 100mm maximum dimension and having no local humps or depressions greater than 150mm. Where the embankment slope is not to receive topsoil, it shall be compacted to provide a stable slope. Where the surface is to receive topsoil, it shall be left with a semi-rough finish free from loose material.

Item coverage shall include for:-

- Compacting of natural ground before forming embankments to 95% Mod. AASHTO. to a depth of at least 150mm; and
- Allowing for shrinkage and wastage of material.

PSD 5.2.3.2 Backfilling of Trenches and Backfilling or Filling against Structures

Add the following:

Excavated material containing little or no organic matter, large clay lumps and excluding stones of average dimension exceeding 200mm may be used for back fill. Suitable material arising from excavations for structures, foundations, footings and the like which is suitable for backfilling shall be stockpiled whilst all other materials from

excavations shall be disposed of offsite. Backfill to structures and that used in the formation of embankments shall be compacted to 95% modified AASHTO density respectively.

Contractors are to note that no overhaul of backfill material will be measured and backfill quantities will only be measured up to the pay lines as indicated on the drawings. The Contractor shall be responsible for backfilling any working space and excavation slopes, over breaking, battering etc., beyond the indicated pay lines.

Backfilling around concrete structures shall only begin once the concrete has attained the specified strength i.e. after a minimum 28 days. No backfilling against water retaining structures shall take place before completion of water tightness test.

PSD 5.2.4.2 Top soiling

Delete the last sentence and replace with:

The final thickness of topsoil after compaction shall be 150mm

PSD 5.2.4.3 Grass and other vegetation

Add to the Sub-Clause:

The topsoil surface of embankments, terraces and other designated areas are to be planted or seeded in accordance with the environmental rehabilitation plan.

The Contractor shall schedule his planting and sowing in order for this activity to fall within suitable seasonal times in order to ensure adequate and acceptable strike rate.

Newly planted vegetation shall be maintained for a minimum of 3 months to ensure an 80% strike rate and growth, however, should vegetation be planted during un seasonal times, maintenance shall continue to ensure growth as required, once the season has turned to conducive growth conditions.

PSD 5.2.5 Transport for Earthworks

PSD 5.2.5.1 Free haul

Replace Clause D 5.2.5.1 with the following: -

The free haul distance for this contract is unlimited. Contractors are to note that no overhaul will be paid.

PSD 5.2.5.2 Over Haul

Delete Sub-Clause and replace with:

All transportation of all excavated material shall be regarded as free haul and no over haul shall be applicable.

PSD 6 TOLERANCES

Add the following to D 6:

The allowable tolerances shall be-

- a) the design angle ± 2 degrees for the angle of the cut or fill slope,
- b) not less than the design width for the transverse horizontal embankment width at any level, and
- c) the layer thickness ± 20 mm for top soil.

For the formation, the Contractor will be required to place level pegs longitudinally at 5m intervals on a road construction contract and elevation tolerances shall be taken on a section of the works. (When portion of the works is less than 500m² one tolerance reading per 10m² shall be taken).

In any section the average of the elevations taken shall be such that the average thickness of the succeeding layer or layers above the formation shall be not less than that specified/nor greater than that specified plus 20mm.

The standard deviation of the differences between the actual and design levels shall not be greater than 10mm.

PSD 6.3 EXCAVATION BY MECHANICAL MEANS (NEW SUB-CLAUSE)

Add new Sub-Clause:

Where bulk excavation is carried out by earth moving equipment, such excavation will only be allowed to within a level of 300mm, or less as ordered by the Employer's Agent, 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 Employer's Agent.

PSD 7 TESTING

PSD 7.2 TAKING AND TESTING OF SAMPLES (NEW SUB-CLAUSE)

Add to the 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.

The cost of all control testing is covered under the Preliminary and General section of the Schedule of Quantities.

PSD 8 MEASUREMENT AND PAYMENT

PSD 8.1 BASIC PRINCIPLES

Add the following to D 8.1.1:

Items coverage shall include for:

1. Loosening or breaking up unexcavated material before or during excavation.
2. Allowing for bulking or shrinkage of material before or during excavation.
3. Blasting where required.
4. Keeping the earthworks free of water.
5. Depositing fill to slope away from vertical drainage layers and providing temporary drainage to prevent surface water from entering such drainage layers.
6. Forming and trimming the slopes.

7. Restrictions on working at sides of structures.
8. Taking precautions to avoid damage to structure, existing sewers, drains and services, including providing temporary supports.
9. The drying of material which cannot be placed immediately in the fill embankments as its in-situ moisture content exceeds the limits specified.
10. Selecting suitable material of stated types and layering or depositing in locations indicated by the Employer's Agent or in stockpiles.

PSD 8.2 COMPUTATION OF QUANTITIES

Add the following to D 8.2.1.

No allowance will be made for bulking or shrinkage and excavation will be paid as being the volume in place before excavation commenced.

Add the following to D 8.2.3:

Prior to commencement of any excavation, the contractor shall notify the Employer's Agent in good time to ensure that measurements, cross-section, levels of the undisturbed ground, or any other relevant information are taken in order that the excavation quantities can be agreed upon between the Employer's Agent and the Contractor.

Where the Contractor submits survey data this is to be in Civil Designer format or in a continuous ASCII file with a format of each line as name, x, y, z.

The codes used to describe the survey points are to be agreed with the Employer's Agent and to be maintained throughout the Contract.

Handwritten notes or printouts on paper will not be accepted.

The Contractor is to ensure that his appointed surveyor is issued with these details prior to any survey work taking place.

Should the information not be received in either of the specified formats, the data may be deemed to be invalid by the Employer's Agent.

PSD 8.3 SCHEDULED ITEMS

PSD 8.3.2 Bulk excavation

PSD 8.3.2.a Excavate in all materials and use for embankment or backfill or dispose of as ordered

Add "including benching, if applicable" after the words "in addition to the cost of excavation "

In the second and last lines delete "Drawing D-1" and substitute "Fig D-1"

PSD 8.3.3.a Restricted Excavation

Delete from "The rate..... fully specified in 5.2.2.1-5.2.2.3 (inclusive) and 5.2.3" in clause 8.3.3(a) and add the following:

The rate shall cover the cost of complying with the precautions required in terms of PSD 5.1 in addition to the cost of excavation, including benching (if applicable), basic selection, loading, transporting, offloading, stockpiling, re-loading, spreading of backfilling, watering, compacting, final grading, complying with the requirements for tolerances, providing for testing, and disposal of spoil, all in accordance with the requirements of the specification.

In the heading delete "Drawing D-2" and substitute "Fig D-2"

PSD 8.3.4 Importing of Materials

Add to the Sub-Clause:

The measured volume of imported fill shall be the difference between the net volume of compacted fill and the net volume of suitable material excavated from the site and actually used as compacted fill. For this purpose, it shall be taken that one cubic metre of suitable material excavated from within the site forms one cubic metre of compacted fill.

PSD 8.3.4.1 From Stockpile

The rate shall cover the cost of obtaining selected backfill or fill material from stockpile, loading, transporting, unloading, spreading in layers not exceeding 150 mm thick, watering, compacting to 95% 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.

PSD 8.3.4.2 From Other Excavations on Site

The rate shall cover the cost of obtaining selected backfill or fill material from other excavations on site, loading, transporting, unloading, spreading in layers not exceeding 150 mm thick, watering, compacting to 95% 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.

PSD 8.3.4.3 From Commercial Sources

The rate shall cover the cost of acquiring suitable material, loading, transporting, unloading, spreading in layers not exceeding 150 mm thick, watering, compacting to 95% 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.

PSD 8.3.5 Working Space

Add the following to D 8.3.5:

PSD 8.3.5.2 Restricted Excavation

The rates for restricted excavation will include for any required allowance for working space. The volume of restricted excavation will be based on the plan area of the structure or item multiplied by the depth measured from the original ground level or a particular datum level agreed prior to commencing excavation.

PSD 8.3.6 Overhaul

Delete item (a)

Delete item (b):

Add to Clause:

No overhaul payment will be applicable.

PSD 8.3.7 Additional Lateral Support

Replace D 8.3.7 with the following:

In compliance with clause D5.1.2, the tendered rate for Excavation and Backfilling shall include for the provision of temporary lateral support where this is required.

This item will not be considered for use by the Contractor for shoring required to facilitate trench stability in terms of the relevant safety legislation. Extensive shoring will be required due to the collapsible nature of the existing ground conditions, the Contractor is to ensure that the tender rate includes for lateral support designed by a professional Employer's Agent for the entire pipeline length.

All temporary works to be carried out in accordance with the Occupational Health & Safety Act, 1993 (Act 85 of 1993): Construction Regulations 2014 and applicable sections of SABS 1200. The design of any temporary works including shoring shall be carried out by a registered professional Employer's Agent.

The

Lateral support will be measured as inclusive of both sides of the trench by the total linear length in metres, parallel to excavations and sundry structures or where to be erected as instructed by the Employer's Agent.

The unit of measurement shall be per metre (m)

PSD 8.3.10 Top soiling

Add to Clause:

The rate shall cover the cost of procuring the topsoil from commercial source, transporting, and spreading in terms of 5.2.4.2 where no topsoil is available from stockpiles.

PSD 8.3.11 Grass and other vegetation

Add to the Sub-Clause:

The rate shall cover the cost planting sods on embankments and/ or terraces and seeding of other designated flat areas inclusive of fertilising, watering until the area is fully covered with grass and maintenance by the Contractor for a minimum period of three months, during suitable seasonal times. This will include watering and weeding of the planted areas as per Clause PSD to the satisfaction of the Employer's Agent and the costs of complying with this requirement are to be included in the rates for grass planting

PSD 8.3.14 Trimming of Embankments - Machine trimming

Add new Sub-Clause:

The unit of measurement shall be the metre (m²)

The rate shall cover the cost of all works required to trim and shape embankments to a suitable level to the satisfaction of the Employer's Agent. Measurements shall be in square metres (m²) measured along the shape of the embankment.

PSD 8.3.15 Trimming of Embankments - Hand trimming

Add new Sub-Clause:

The unit of measurement shall be the metre squared (m²)

The rate shall cover the cost of all works required to trim and shape embankments to a suitable level to the satisfaction of the Employer's Agent. Measurements shall be in square metres (m²) measured along the shape of the embankment.

PSD 8.3.16 Barricading (New Sub-Clause)

Add new Sub-Clause:

The unit of measurement shall be the metre (m) for any of the type of barricading or fencing specified under PSD 5.1.1.1 – Barricading and lighting

The quantity for these items will be reflected as provisional quantities.

Barricading will be measured as inclusive of both sides of the working corridor by the total linear length in metres, parallel to excavations and sundry structures or where to be erected as instructed by the Employer's Agent. The materials for each barricade type may be re-used as the working front progresses and the tendered rates shall include for manufacturing, delivering to site, erection, maintenance, provision of access points as well as closing off at ends of work fronts as well as dismantling and re-erection at different locations as and where required.

Barricading material shall be functional at all times and shall be replaced when such functionality is not to the satisfaction of the Employer's Agent.

The rate for Armco type barriers shall be deemed to include for the reinstatement of the paved road surface in terms of PSD 5.1.1.1- Item 5

PSD 8.3.16 Survey of Surrounding Structures Before Blasting (New Sub-Clause)

Add new Sub-Clause:

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

PSD 8.3.17 Photographic Record (New Sub-Clause)

Add new Sub-Clause:

The rate for extra over for excavation in rock shall cover the cost of providing a photographic record of neighbouring structures before blasting commences.

DRAFT DO NOT USE

PSDB EARTHWORKS (PIPE TRENCHES) (SABS 1200 DB – 1989)

PSDB 3 MATERIALS

PSDB 3.1 CLASSIFICATION FOR EXCAVATION PURPOSES

Amend this clause to read similar to that described under clause PSD 3.1 of the Variations and Additions to the Standardised Specification for Earthworks (SABS 1200 D – 1988)

PSDB 3.3 SELECTED GRANULAR MATERIAL

Delete Sub-Clause and replace with:

See Clause PSLB 3.1

PSDB 3.4 SELECTED FILL MATERIAL

Delete Sub-Clause and replace with:

See Clause PSLB 3.2

PSDB 3.5 BACKFILL MATERIAL

- (a) In the third line delete "150mm" and substitute "100mm".
(b) In the second line delete "P.I not exceeding 12" and substitute "P.I not exceeding 6".

PSDB 3.7 SELECTION

Add the following to DB 3.7:

Contractors are advised that the stockpiling of excavated material suitable for use as backfilling, will be permitted alongside trench excavations where possible. All other excavated material unsuitable for re-use, either as backfill or for the formation of embankments shall be disposed of at the spoil site. No overhaul will be paid.

PSDB 5 CONSTRUCTION

PSDB 5.1 PRECAUTIONS

PSDB 5.1.2.2 Special water hazards

Add to the Sub-Clause:

The Employer's Agent may direct the Contractor to implement subsoil drainage measures at certain sections of the pipe trench where ground water seepage is considered significant. Such drainage measures shall consist of a free draining granular material such as 26.5mm crushed stone wrapped in porous geo-membrane placed underneath and/or alongside the pipe and/or in separate drainage trenches from where a suitably sized pipe, as directed by the Employer's Agent, will lead the collected water away from the pipeline trenches.

This work shall be undertaken as per the relevant detail drawing as instructed on site by the Employer's Agent.

PSDB 5.1.2.3 Sloping ground

Delete the Sub-Clause and replace with:

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, pipeline(s), road works, reinstated work 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. The Contractor shall deploy whatever systems he needs to, in order to give effect to this requirement.

Once reinstatements have been completed along sections not in a road reserve, contour/diversion berms, generally extending across the full width of the working corridor, consisting of low earth mounds shaped to rounded form and so oriented as to have a fall of 1% along their length, in general terms, shall be constructed with compacted non erodible 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.

The height of the contour/diversion berms for a distance of 1 metre on either side of the trench centreline shall be raised 150 mm 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 0,5 m upstream of the cross-embankment.

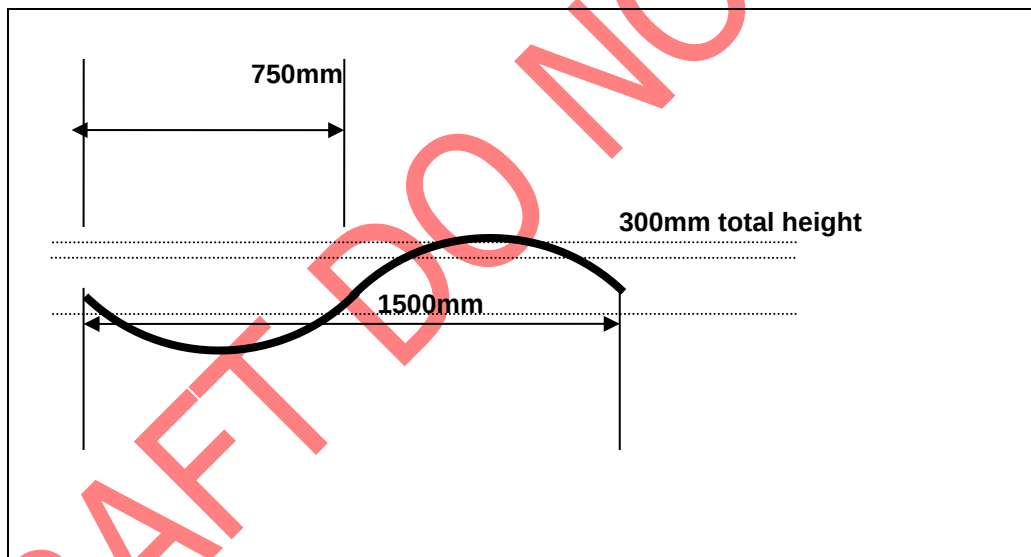
Contour/diversion berms shall be constructed to the same minimum standards and dimensions indicated wherever artificial slopes have been formed in the working corridor, or other areas used during construction and with the approval of the Employer's Agent, are permitted to be left as is.

The following general conditions apply to contour/diversion berms

- Contour berms shall be constructed on slopes with gradients of between 1:100 and 1:1 (Slope Categories 1, 2 and 3), upon instruction by the Employer's Agent.
- Contour berms shall be constructed as per cross section detail A noted below.
- Where contour berms are constructed on soils with a high (>35% clay) content the gradient of the canal at the base of the up-slope side of the bank shall be 1:100 and on loam soils (35 – 15% clay) the gradient of the canal shall be 1:200.
- Where the construction corridor runs primarily across the contours the contour berm shall extend across the entire width of the cleared corridor and the discharge end of the contour berm must, where possible, extend into adjacent vegetation for a distance of 3.0 metres.
- Where the construction corridor runs more or less parallel to the contours contour berms may not exceed 300m in length without provision being made for captured runoff to exit the berm.
- Where a berm which is parallel to the contour is constructed, and is less than 150m long, the gradient for the runoff canal should be 2% on soils with high clay content and 1.5% on loam soils. Where a berm which is parallel to the contour is constructed and is between 150m and 300m long the gradient for the runoff canal for both clay and loam soils must be 1%.
- Ideally, water discharged from the end(s) of such berms should be into a natural watercourse which does not display signs of accelerated erosion within a distance of 500m from the downside of the corridor.
- In the event that a natural watercourse does display signs of accelerated erosion within 500m of the downside of the corridor, measures, such as installation of a suitable geotextiles, or structures such as a reno mattress, must be put in place before runoff associated with the corridor is discharged into it.
- Contour berms shall be constructed in such a manner to ensure that water is diverted to a less erodible location.

- Contour berms shall be at least 300mm high (+/- Variance of 10mm) at its highest point relative to the surrounding soil.
- Contour berms shall be at least 300mm (+/- Variance of 10mm) deep to the lowest point relative to the surrounding soil.
- Contour berms shall be adequately compacted to avoid erosion.
- Contour berms shall be constructed with the installation of a geosynthetic liner such as “Kaytech Soilsaver 292” or similar approved product where required. The Employer’s Agent will instruct on requirements, based on local conditions when finishing off the work.
- Contour berm exit points shall be fitted with the installation of “Kaytech Grassfence” (or similar approved product) across the width of the berm at the exit point, splayed at 30 degrees towards the slope upper side with the curtain embedded into the berm invert by at least 75mm.
- All geofabrics used must be anchored in the invert.
- Contour berms shall be constructed at vertical intervals determined by slope gradient as identified in the table below:

Detail A - Berm Shape Cross Section



The following table specifies the **vertical** interval between contour berms which must be constructed on slopes of different steepness. Note that on slopes of 1:5 and steeper contour berms are to be used together with geotextiles to reduce soil loss and slope failure.

Table Vertical intervals (meters) for soils with moderate potential risk of eroding in areas experiencing a mean annual rainfall of 750-800mm and greater

Vertical intervals (m) for soil with	Land Slope (%)	2	3	4	5	6	7	8	9	10	11	12

medium erodibility potential	Vertical intervals (m)	0.8	0.9	1	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
------------------------------------	------------------------------	-----	-----	---	-----	-----	-----	-----	-----	-----	-----	-----

Geofabric Products

Only geotextile material which is supplied by a company which provides on-site training on how their product(s) should be installed may be used.

The Contractor shall provide written confirmation to the Employer's Agent of the staff who have attended the Supplier's onsite training courses on how their product(s) should be installed.

Woven 100% Natural Jute Fibre as Kaytech Soilsaver 292® or similar approved product

- Will be utilized on slopes with a gradient of 1:5 and steeper up to, but not exceeding 1:2 (Slope Category 2).
- Will be installed in consultation and in accordance with the manufacturer's specifications.

Woven 100% Natural Jute Fibre such as Kaytech ECC-2B double net blanket, Biomac-C® or similar approved product

- Will be utilized on slopes with a gradient of 1:2 and steeper up to, but not exceeding 1:1. (Slope Category 3)
- Shall be installed in consultation and in accordance with the manufacturer's specifications.

Woven tape strips arranged in a cellular honeycomb structure such as Kaytech Multi Cell®, Maccaferri – Armater® or similar approved product

- Will be utilized, upon instruction from the Employer's Agent, on slopes of 1:1 and steeper (Slope Category 4) depending upon soil conditions.
- Will be installed in consultation with the supplier and in accordance with the manufacturer's specifications.

Woven 100% Natural Jute Fibre with double twisted hexagonal woven steel wire mesh such as Maccaferri-MacMat-R® or similar approved product

- Will be utilized, upon the instruction of the Employer's Agent, on slopes of 1:1 and steeper (Slope Category 4) up to near vertical faces.
- Will be installed in consultation and in accordance with the manufacturer's specifications.

PSDB 5.1.2.4 Cross walls in trenches (New sub-clause)

Add new Sub-Clause:

Where indicated on the drawings or as instructed by the Employer's Agent, the Contractor shall construct cross walls in the trench on steep sections of the pipeline to prevent bedding from becoming a drainage path for ground water.

PSDB 5.1.4 Existing Services that Intersect or adjoin Trenches

The requirements of PSD 5.1.2 and the relevant Project Specification clauses are applicable.

PSDB 5.2 MINIMUM BASE WIDTHS

In the 3rd and 5th line, delete the word "External" and replace with "Nominal." Delete the table and replace with the following table:

Nominal Diameter of Pipe Barrel		Side Allowance on each side (mm)
Over	Up to and Including	
-	DN 125	300
DN 125	DN 500	300
DN 500	DN 1 000	600
DN 1 000	-	600

Add to the Sub-Clause:

A greater base width may be allowed at the discretion of the Employer's Agent, provided that the Contractor proves to the Employer's Agent that the working space allowed by this Sub-clause is insufficient to carry out his pipe laying and backfilling activities in accordance with the specification. The tendered rates for excavation of pipe trenches shall be deemed to include for a greater base width as specified in this clause, should the Contractor wish to use a greater base width than that indicated.

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 tendered rate for the excavation for pipe trenches shall include for the excavation of bell/ fox holes at pipe joints and/or segmented bends.

Overbreak in rock excavation, over and above side allowances stated in table above to be made good with mass concrete 15MPa and tendered rates shall include for all work, including shuttering.

PSDB 5.4 EXCAVATION

Add to the Sub-Clause:

The length of pipe trench excavation for the laying of the water pipeline, shall be limited in terms of the relevant Project Specification Clauses.

Where the pipe trench crosses surfaced roads, the Contractor shall neatly cut two parallel grooves into and through the surfacing before excavating between the grooves. The grooves are to be set back at least 200mm from the edge of the excavation face to prevent raveling of the cut edge. The cost of this operation shall be deemed to be included in the tendered rates for pipe trench excavation.

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

The Contractor shall take all the steps necessary to ensure that no person is required or allowed to work in a trench or any other unsupported overhanging excavation which is more than 1,5 m deep, and any excavation which has not been adequately supported, shored or braced if there is any danger whatsoever of the sides of the excavation collapsing. The support, shoring or bracing to be designed and constructed by the Contractor, shall be strong and sturdy enough to support the sides of the excavation in question. Should conditions on site require support, shoring or bracing at depths shallower than 1.5m, then the required safety measures shall be implemented.

Where a stormwater or sewer pipe crosses a road in fill or an area to be filled, trench excavation shall take place before the road or area is filled. The Works shall be measured as per item 8.3.2 and PSBD 8.1.2 (c).

Where site conditions permit, all materials excavated and required for backfilling shall be removed and neatly stacked where possible along the higher side of the trench, care being taken to restrict the area so occupied so as to cause the minimum of obstruction. Care shall be taken to protect existing structures such as walls, fences, gateways and also hedges, trees, gardens, etc., from damage by material so stacked.

General

- (a) Excavation shall be undertaken in whatever material is encountered and to such levels and widths as are indicated on the drawings, in the specification and as instructed by the Employer's Agent. Trench excavation shall be undertaken in narrow trenching conditions with vertical sides necessitating the use of shoring and open battered trench excavation will not be permitted unless otherwise stated in Project Specification.
- (b) Control of the dimensions of the excavations shall be by means of boning rods and sight rails, an acceptable base beam device or other approved method. If the first method is used the Contractor shall erect sight rails over the centre of each manhole or vertical bend and along the length of the excavation with a maximum distance of 30m apart and with a minimum number of 3 for any one length of excavation being undertaken. The centre line of the pipeline shall be denoted on each sight rail both back and front by a single vertical line and either side of the centre line painted with contrasting colours.
- (c) The Contractor shall place a reference peg alongside each sight rail, take the levels and give their values to the Employer's Agent.
- (d) Should the Contractor excavate to a greater depth than specified he shall, at his own expense, replace the excess material so removed with selected fill compacted to 93% Mod. AASHTO density, or grade 10/26 concrete if the use of selected fill is not practical.
- (e) Where site conditions permit, all materials excavated and required for backfilling shall be removed and neatly stacked where possible along the higher side of the trench, care being taken to restrict the area so occupied so as to cause the minimum of obstruction. Care shall be taken to protect existing structures such as walls, fences, gateways and also hedges, trees, gardens, etc., from damage by material so stacked.

PSDB 5.4.1 Open Trench Limits (New Sub-Clause)

Add new Sub-clause:

The open trench limits are governed by the relevant Project Specification clauses. All aspects of lengths of work fronts as specified in this clause shall be enforced at all times.

PSDB 5.5 TRENCH BOTTOM

Replace "90%" with "93%".

Add to the Sub-Clause:

Should any portion of a pipe trench exceed the specified depth, the Contractor shall be held responsible for any additional costs which may arise as a result of such over-excavation. Where the Contractor has over excavated the depth of the trench, the Contractor shall at his own expense replace the excess material so removed with suitable fill material compacted to 93% MAASHTO density or with 10Mpa concrete, as directed by the Employer's Agent.

Where unsuitable soft, wet material occurs on the trench bottom, the Employer's Agent may instruct the Contractor to remove such material and replace with other granular material selected from the site or imported. This material will be used to make up the soft material removed, up to the level of the bottom of trench. Upon instruction by the Employer's Agent, selected rock fill will be required to make good the unsuitable soft material. The surface of this selected rock fill (as instructed by the Employer's Agent) shall be levelled off using pipe cradle material or stone bedding. Should such selected rock fill not be available, the Employer's Agent will instruct the Contractor to use clean, free draining granular material.

For welded steel pipes, the trench shall be widened and deepened over a suitable length at the joints on each side of and beneath the pipe to allow working space for the jointing. This additional excavation is to be included in the tendered rates for trench excavation.

PSDB 5.6 BACKFILLING

PSDB 5.6.1 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 necessary tests on the welded joints of the pipeline and on the joint wrapping at such joints.

PSDB 5.6.2 Material for Backfilling

Delete second paragraph and substitute the following:

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

PSDB 5.6.3 Disposal of Soft Excavation Material

Add the following:

Material which the Employer's Agent considers to be unsuitable for the bottom of the trench shall be excavated to depths as instructed and disposed of as surplus material. The resultant space shall be refilled, as ordered, with approved material and compacted to a 93% Mod. AASHTO density.

PSDB 5.6.4 Disposal of Intermediate and Hard Rock Material

Delete the Sub-Clause and add the following:

Surplus intermediate and hard rock material from trench excavations shall be disposed of offsite to an approved spoil disposal site.

PSDB 5.7 COMPACTION

Add to the Sub-Clause:

The Contractor shall make provision in his rates for compaction of trench backfill and compaction where such backfill to be compacted has to be with suitable equipment and machinery, small enough to fit into trench dimensions. The Contractor cannot assume the use of large road works machinery for the purpose of trench backfill and compaction where not suitable. All tendered rates shall be deemed to include for the compaction under restricted trench widths where required.

PSDB 5.7.1 Areas Not Subject to Traffic Loads

In the second line, delete 300 mm and replace with 150 mm.

In the third line, replace the words 90% of modified AASHTO with 95% of modified AASHTO.

Add to the Sub-Clause:

Particular attention shall be paid to compaction of material in the pipe haunch area. Material shall be brought up evenly on either side of the pipe barrel in layers not exceeding 150 mm (measured loose) and carefully compacted to avoid movement and deflection of the pipe.

The Contractor is to take special care not to inflict damages to the pipe coating when compacting bedding and blanket materials close to the pipe.

PSDB 5.7.2 Areas Subject to Traffic Loads

In the third line, replace the words 93% of modified AASHTO with 97% of modified AASHTO and replace the words 95% of modified AASHTO with 98% of modified AASHTO.

Add to the end of the sentence:

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

Add to Sub-Clause:

All backfill to pipes under roads and in road reserves shall comply with the requirements of sub-clause 3.5(b) and shall be compacted in accordance with Sub-Clause PSDB 5.7.2

Add to the Sub-Clause:

Particular attention shall be paid to compaction of material in the pipe haunch area. Material shall be brought up evenly on either side of the pipe barrel in layers not exceeding 150 mm (measured loose) and carefully compacted to avoid movement and deflection of the pipe.

The Contractor is to take special care not to inflict damages to the pipe coating when compacting bedding and blanket materials close to the pipe.

PSDB 5.9 REINSTATEMENT OF SURFACES

PSDB 5.9.4 Bitumen Roads, Sub Base and Base

Add to Sub-Clause:

The Contractor shall include in his tendered rates for the reinstatement of all surfaces and including for all layer works, to their conditions prevailing before the commencement of construction.

Items have been included in the Bill of Quantities to price for 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 400mm (refer PSDB 5.4).

PSDB 5.11 TRENCH WALL STABILITY (NEW SUB-CLAUSE)

Add new Sub-Clause:

Notwithstanding the requirements of PSDB 5.4.1, the Contractor shall take responsibility for the length of trench open at any time and if collapse of the side walls occurs for any reason, the responsibility will be the Contractors and he will reinstate and make good at his own cost.

PSDB 5.12 SAFETY (NEW SUB-CLAUSE)

Add new Sub-Clause:

The Contractor shall comply with the requirements of the Occupational Health and Safety Act (Act 85 of 1993) when conducting trench excavations.

Refer to Sub-Clause 5.3 of SABS 1200A for Contractor's responsibilities.

The Contractor shall meet his obligations for shoring of trenches in terms of legislative requirements, under all circumstances.

PSDB 5.13 JOINTING HOLES (FOX HOLES) (NEW SUB-CLAUSE)

Add new Sub-Clause:

Jointing holes for pipes, also defined as Fox Holes in this specification, shall be formed of sufficient length and depth to allow working space for the proper jointing and wrapping of the pipe joints, pipe specials and other fittings which require wrapping.

After the pipe work has been inspected, tested, hydraulically tested and approved by the Employer's Agent, the jointing holes shall be backfilled and compacted to the same specification as that of the bedding material and compaction of trenches as specified under Clauses PSLB 3.

No additional payment will be made for forming and backfilling of fox holes, the cost of which is deemed to be included in the tendered rates for the excavation of pipe trenches.

PSDB 7 TESTING

Add the following:

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. The format of the data to comply with the requirements as specified under the section dealing with the construction dossier.

The Contractor's quality control records shall be available for inspection at all times. Copies of these records shall be made available on request.

The contractor shall carry out process control checks on the compaction of the backfill of all trenches.

The Employer's Agent may appoint a 3rd party inspection authority to carry out quality surveillance on its behalf. The Contractor shall provide all facilities and access to works at all reasonable times as may be necessary for the independent body to carry out its function.

Quality surveillance will be undertaken by the Employer's Agent:

- a) when requested by the Contractor
- b) at the discretion of the Employer's Agent

Advance notice of a minimum of 8 normal working hours shall be given by the Contractor to the Employer's Agent when requesting inspection of any portion of the works.

Notwithstanding any surveillance carried out by the Employer's Agent, the Contractor shall retain full responsibility for the quality of all trench compaction carried out under the contract.

The cost of all control testing by an independent 3rd party inspection authority is covered under the Preliminary and General section of the Schedule of Quantities.

Density readings will be taken at random over the layer. The layer is acceptable should the Quality Surveillance fulfil the following requirements:

$$X \geq A \% + 0,5S$$

where:

X = Arithmetic mean of density readings for the layer.

A = Percentage Mod. AASHTO as defined in the specification for the layer.

S = Standard deviation.

The compaction control testing shall be carried out by the Contractor.

Density

Position	Roadways, Sidewalks	Other Locations
Trench formation	1 No. per 30 linear m	1 No. per 100 linear m
Bedding Cradle & Selected Fill Blanket	2 No. per 30 linear m	1 No. per 100 linear m per layer
Backfill	1 No. per layer per 15m ² or part hereof	1 No. per 2 layers per 50m ² or part hereof

If the results of such density tests (which shall not be taken on the bedding material directly above the pipe) show that the material has been compacted to a density equal to or in excess of the applicable specified value (refer to Clause 5.7), the compaction will be accepted. If the density is found to be below the specified value, the Employer's Agent may order the re compaction and retesting of the backfill at the Contractor's expense.

The cost of testing shall be deemed to be included in the rates for excavation.

PSDB 8 MEASUREMENT AND PAYMENT

PSDB 8.2 COMPUTATION OF QUANTITIES

PSDB 8.2.4 Shoring

Add to Sub-Clause

Except where shoring is specifically ordered by the Employer's Agent, the cost of shoring used, as well as the cost of any additional excavations required to install the shoring, will be deemed to be included in the rates tendered for the excavations. All shoring costs to meet legislative requirements shall be for the account of the Contractor.

PSDB 8.3 SCHEDULED ITEMS

PSDB 8.3.2 Excavation

Add the following to Sub-Clause 8.3.2 (a):

All trench excavation shall be restricted excavation within confined working widths. The Contractor shall take note of the terrain and environment in which the pipe is to be laid and shall include in his excavation rate for every eventuality, covering restricted access, confined spaces, shoring, high traffic volumes, accommodating traffic, providing access for pedestrian users, working in road reserves of various widths, working in working corridors of restricted width, shoring and working in the vicinity of existing services.

The Contractor shall include in his rate for the provision of special mechanisms and equipment for all eventualities, should it be required, working in areas of restricted access where the excavation of the pipe trench, the removal of spoil and all other aspects that require consideration in order to excavate the pipe trench.

Excavation for cable ducts shall be measured under this clause.

Add the following to Sub-Clause 8.3.2 (b):

Unit of measurement

Unit: m³

1. Hand excavation and backfill where ordered by the Employer's Agent

2. Boulder Excavation Class A
3. Boulder Excavation Class B
4. E/O for excavation at grades steeper than 1:3

Measurement of extra over will not apply to any length of trench in soft material more than 2m long. Surplus boulder material from trench excavation shall where applicable, be disposed of to the designated spoil areas.

Add the following sub-items in 8.3.2 after sub item 8.3.2(c):

5. Excavate in all materials for stormwater inlet and outlet structures and for manholes, catch pits, valve chambers and the like, irrespective of depth and backfill around structures.

Unit of measurement

Unit: m³

The unit of measurement shall be the cubic metre of material excavated, measured in place according to the authorised dimensions, and excluding the volume of material excavated and paid for under sub-item (a).

The tendered rate shall include for the costs of excavating in all materials, backfilling, compacting, trimming and tidying of the final surface around the structure, disposing of surplus and unsuitable materials within the free haul distance and where applicable, selecting and keeping separate, excavated material suitable for use as backfill.

6. Excavate open drains in all materials

Unit of measurement

Unit: m³

The tendered rates shall include full compensation for excavating in all materials within the dimensions specified or authorised by the Employer's Agent and to the specified lines and profiles, for the disposal of surplus and unsuitable excavated material where applicable, and in the case of item (d), for backfilling with suitable approved material compacted to 93% of modified AASHTO density around the structures.

- 7 Extra-over sub-items 5 and 6 for excavating in:

- 7.(1) Intermediate material Unit: m³

- 7.(2) Hard rock material Unit: m³

Measurement and payment shall be in accordance with the provisions of 8.3.2(b) of SABS 1200D (as amended)."

PSDB 8.3.3 Excavation Ancillaries

PSDB 8.3.3.3 Compaction in Road Reserves

Add to the Sub-Clause:

"In the case of gravel roads, determining the volume, the depth will be measured from the underside of the gravel wearing course to the top of the fill blanket, and in the case of bitumen roads, from the underside of the subbase to the top of the fill blanket".

The rest of the trench shall be backfilled as specified in Clauses 5.9.3, 5.9.4 and 5.9.5, as applicable.

PSDB 8.3.4 Particular Items

Add to Sub-Clause:

The unit rate for trench shoring to remain in the excavation shall include for-

- (1) the supply and placing of trench shoring and other support measures,
- (2) maintenance, and
- (3) additional costs for backfilling and compaction with trench supports left in trench.

PSDB 8.3.5 Existing Services that Intersect or Adjoin a Pipe Trench

Under Item a) in the 5th line, delete the phrase "...whether or not their presence is known before they are uncovered..."

Add to the Sub-Clause:

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

PSDB 8.3.8 Soilcrete (New Sub-Clause)

Add new Sub-Clause:

The unit measurement shall be the cubic metre (m³).

Soilcrete shall consist of an approved soil or gravel mixed with 5% by mass of Portland Cement and only sufficient water to give it a consistency that will permit the soilcrete to be placed, using vibrators. The material used for soilcrete shall be sandy granular material of the following specifications:

- | | |
|-----------------------------|-------|
| • Minimum Grading Modulus: | 1,2 |
| • Maximum Plasticity Index: | 10 % |
| • Maximum particle size: | 38 mm |

Detrimental percentages of silt and clay shall be avoided.

The soilcrete shall be mixed on site using suitable concrete mixers and the water and cement contents shall be carefully controlled. It shall be placed and thoroughly compacted by means of concrete vibrators so that all voids are filled.

The unit rate shall also include for-

1. supply of cement and any other materials required,
2. all mixing and processing of the material, and
3. complying with any time restriction.

PSDB 8.3.9 Construction of impervious clay barrier across pipe trenches to prevent the flow of groundwater in bedding material (New Sub Clause)

Add new Sub-Clause:

Payment for impervious clay barrier across pipe trenches, as per the relevant drawing in terms of the instruction by the Employer's Agent, will be by m³ of material compacted to construct cross walls in accordance with the specification.....
.....Unit: No.

PSDB 8.3.10 Extra over for excavation of pipe trenches in areas of restricted access (New Sub Clause)

Add new Sub-Clause:

The Contractor shall take note of the terrain and environment in which the pipe is to be laid and shall include in his rate for every eventuality, covering restricted access, confined spaces, high traffic volumes, accommodating traffic where required, providing access for road users to properties, working in road reserves of various widths, working in working corridors of restricted width, working in the vicinity of archaeological findings or areas of historical importance which requires special care to be taken to protect same or whichever condition might present itself during construction.

The Contractor shall include in his rate for the provision of special mechanisms and equipment for all eventualities, should it be required, working in areas of restricted access where the excavation of the pipe trench, the removal of spoil and all other associated activities that are impeded as a result of difficult access, the management of traffic flow and all other aspects that require consideration in order to excavate the pipe trench.

The Contractor shall ensure that residents have access to their properties and that access to relevant road users is maintained at all times, that traffic control is exercised as per the relevant specification and that the appropriate construction technique is utilized for the specific site constrictions. Refer to SANS 1921.

The Contractor shall familiarize himself with the pipeline route and the terrain over which the pipeline is to be constructed and the tendered rates under Item PSDB 8.3.2 and this item shall be deemed to include for all eventualities to excavate the pipe trench. No Extra Over for the excavation of pipe trench in areas of restricted access will be considered other than for the sections noted in the Bill of Quantities.

1. Extra Over PSDB 8.3.2 for excavation of pipe trench in areas where the width of the working space is restricted. Section "from to " Unit: m

PSDB 8.3.11 Ripping Unit: m²

Add new Sub Clause:

Ripping of the top 400mm layer of topsoil to enhance establishment of new plants.

The tendered rate shall include for full compensation for plant, materials, fuel and labour necessary to ensure ripping of compacted tracks to a maximum depth of 400 mm.

PSDB 8.3.12 Contour (Diversion) Berms

Unit: m

Add new Sub Clause:

The tendered rate shall include full compensation for the plant, labour and fuel to shape and compact contour (diversion) berms.

Measure per m length.

Planting on berm is extra over to berm construction.

Creation and finishing off of contour berms in terms of the specification.

PSDB 8.3.13 Geofabric Product Application

Add new Sub-Clause:

Geosynthetic application by m², based on Employer's Agent's decision what to use so quantities are provisional.

PSDB 8.3.13.1 Woven 100% Natural Jute Fibre as Kaytech Soilsaver 292® or similar approved product

Unit: m²

Payment will be made based on the actual area of fabric laid. The tendered rates shall be deemed for transportation, handling, manipulating, securing to the ground, folding, stitching or whatever is required to have the fabric laid according to the manufacturers specifications.

PSDB 8.3.13.2 Woven 100% Natural Jute Fibre such as Kaytech ECC-2B double net blanket, Biomac-C® or similar approved product

Unit: m²

Payment will be made based on the actual area of fabric laid. The tendered rates shall be deemed for transportation, handling, manipulating, securing to the ground, folding, stitching or whatever is required to have the fabric laid according to the manufacturers specifications.

PSDB 8.3.13.3 Woven tape strips arranged in a cellular honeycomb structure such as Kaytech Multi Cell®, Maccaferri – Armater® or similar approved product

Unit: m²

Payment will be made based on the actual area of fabric laid. The tendered rates shall be deemed for transportation, handling, manipulating, securing to the ground, folding, stitching or whatever is required to have the fabric laid according to the manufacturers specifications. The rate shall include for the filling of cells with topsoil/treated topsoil as required.

PSDB 8.3.13.4 Woven 100% Natural Jute Fibre with double twisted hexagonal woven steel wire mesh such as Maccaferri-MacMat-R® or similar approved product

Unit: m²

Payment will be made based on the actual area of fabric laid. The tendered rates shall be deemed for transportation, handling, manipulating, securing to the ground, folding, stitching or whatever is required to have the fabric laid according to the manufacturers specifications. The rate shall include for the filling of cells with topsoil/treated topsoil as required.

PSDK GABIONS (SABS 1200DK)

PSDK 1 SCOPE

Add to Sub-Clause:

This specification also applies to Reno Mattresses, Terramesh and the materials that they are manufactured of. For simplicity the word "Gabion" is used and may be changed or have the words Reno Mattress and/or Terramesh added singularly or in combination as appropriate unless specifically stated otherwise. In general, for protection over large flat areas the word "mattress" describes the implementation of a small height gabion basket.

The word "Plastic Coated" refers to a UV stabilised/resistant polymer coating extruded over the externally-coated wire.

PSDK 2 INTERPRETATIONS

PSDK 2.3 DEFINITIONS

Add to the Sub-Clause

Box dimensions for gabions are stated under sub-clause PSDK 3.1.2.

Wire for cages need to zinc/Al coated and not just zinc coated.

Mattress dimensions are sated under sub-clause PSDK 3.1.2.

PSDK 3 MATERIALS

PSDK 3.1.1.1 Quality

Add to the Sub-Clause:

The stone shall be subjected to the weathering test.

The stone shall be subjected to the durability test.

PSDK 3.1.2 Gabion Cages and Mattresses

Add to the Sub-Clause:

Wire for wire baskets (Mattress and/or Gabion structures) shall be double twisted hexagonal steel wire mesh manufactured to EN 10223-2 with wire being coated with inner zinc/Al5% coating and outer Polymer coating where required.

The gabion baskets shall be as follows:

Boxes of double twisted, hexagonal wire mesh gabions of nominal 80mm mesh made up from minimum of 2.7mm o/d mesh wire with zinc/Al coating and polymer coating taking final o/d to a minimum of 3.7mm, complete with partitions at 1m centres, complete as described in SABS 1200DK and in the following sizes: -

L	W	H
1.0m	1m	.5m

1.0m	1m	1m
1.5m	1m	1m
2.0m	1m	1m
3.0m	1m	1m
4.0m	1m	1m

Mattress baskets shall be as follows:

Boxes of double twisted, hexagonal wire mesh gabions of nominal 60mm mesh made up from minimum of 2.2mm o/d mesh wire with zinc/Al5% coating, complete with partitions/diaphragms in the following sizes: -

L	W	H
2.0m	1m	.17m
2.0m	1m	.23m
2.0m	1m	.30m
2.0m	2m	.17m
2.0m	2m	.23m
2.0m	2m	.30m
3.0m	2m	.17m
3.0m	2m	.23m
3.0m	2m	.30m

PSDK 3.1.3 Geotextile

Add to the Sub-Clause:

The geotextile shall consist of 100% polyester continuous non-woven filaments having a mass of 210g/m² with minimum energy absorption of 6.5kJ/m such as "AG200".

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 3.1.6 Wire and Polymer coating (New Sub Clause)

New Sub-Clause:

The wire used for the fabrication of wire mesh cages for gabions or mattresses and for lacing and bracing operations shall be plain mild steel wire with external zinc aluminium(5%Al) coating and where required, with UV resistant Polymer coating.

Mild steel wire for gabion baskets shall be a minimum of 2.7mm thick before coating is applied.

Mild steel wire for mattress baskets shall be a minimum of 2.2mm thick before coating is applied.

It shall be capable of resisting effects of natural weather exposure, immersion in saltwater and not show any material difference in its initial characteristics over an extended period of time.

PSDK 3.2 PITCHING

PSDK 3.2.1 Stone

In Table 2, Column 2 for extra heavy: delete "300" and replace with "500".

PSDK 5 CONSTRUCTION

PSDK 5.2.3 Assembly

Add to the Sub-Clause:

All cages shall be connected to adjacent cages by lacing the adjacent edges together with 2,7mm dia. coated wire. The lacing shall be in accordance with Sub-Clause 5.1.2.

All wire shall comply to the manufacturer's specifications and quality standards and the supplier of the cages' specification requirements.

PSDK 5.2.4 Rock filling

Add to Sub-Clause:

Particular care shall be taken in the filling of gabions so as to ensure that the voids in the rockfill are reduced to the minimum which can be reasonably achieved. In order to minimise the voids in the rock filling, 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.

Terramesh cages are to be filled and packed in accordance with the manufacturer's specifications and guidelines (In some cases soil fill may be required).

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 Employer's Agent.

PSDK 7 TESTS

Add to the Sub-Clause:

The Contractor is to provide proof of materials testing as described in the specification.

An item has been allowed for additional testing should this be deemed necessary by the Employer's Agent.

PSDK 8 MEASUREMENT AND PAYMENT

PSDK 8.2.2 Gabions

Delete the 2nd and 3rd sentence and replace with:

The unit of measurement shall be the cubic metre of the rock-filled cages. Where specified for Terramesh the unit will be the cubic metre of imported soil filled gabion. The quantity shall be calculated from the dimensions of the gabions indicated on the drawings or prescribed by the Employer's Agent, irrespective of any deformation or bulging of the completed gabions.

The Tendered rate shall include compensation for supplying all material, including rock or imported soil fill wire-mesh cages, galvanizing/Al coating, Polymer coating, tying and connecting wires, loading, transporting and off-loading, the assembly and filling of cages, and any other work necessary for constructing the gabions.

- | | | |
|----|---|----------------------|
| a) | Galvanised gabion boxes | Unit: m ³ |
| b) | Polymer –coated gabion boxes (Terramesh) | Unit: m ³ |
| c) | Galvanised gabion mattresses (Reno's) | Unit: m ³ |
| d) | Polymer –coated gabion mattresses (Terramesh) | Unit: m ³ |

PSDK 8.2.3 Extra Over item 8.2.2 for packing selected stone for exposed faces

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.

PSDK 8.2.4 Geotextile or Geomembrane

Add to Sub-Clause:

The geotextile type shall be AG 200 Geotextile

Unit

Unit: m²

PSDK 8.2.8 Excavate material for Gabions (New Sub Clause)

Add new Sub-Clause:

The tendered rate shall cover the cost of clearing, excavation, stockpiling, backfilling and compacting all material for gabions and to spoil the surplus material at the designated spoil site.

Unit:

Unit: m³

PSDK 8.2.9 Foundation trench and backfilling (New Sub Clause)

Add new Sub-Clause:

The unit of measurement shall be cubic metre of excavation made in accordance with the authorized dimensions. The tendered rates shall include full compensation for excavating in each class of material, including unavoidable overbreak, trimming of trenches, compacting the trench inverts, backfilling and compacting the backfill, and the disposing of surplus excavated material at the designated spoil site

Foundation trenching and backfill in all classes of material, inclusive of spoil disposal at an approved spoil disposal site.

Unit: m³

PSDK 8.2.10 Surface preparation for bedding the Gabions (New Sub Clause)

Add new Sub-Clause:

The unit of measurement for levelling and preparing surfaces for receiving the gabion cages shall be the square metre to the neat dimensions for revetments, aprons or wall foundations. The tendered rate shall include full compensation for preparation, filling any cavities with rock and the levelling off of the ground surface so as to be ready for receiving the gabion cages.

Surface Preparation to Gabions

Unit: m²

PSG CONCRETE STRUCTURAL (SABS 1200 G – 1982)

PSG 3 MATERIALS

PSG 3.1 APPROVAL OF MATERIALS

Add to the Sub-Clause:

Only potable water shall be used for concrete mixing.

PSG 3.2 CEMENT

PSG 3.2.1 APPLICABLE SPECIFICATIONS

Delete sub clause and replace as follows:

SANS 50197-1 and 2: common cements, and SANS 50413 – 1 and 2: Masonry cement applies to this contract

Ordinary Portland cement having an equivalent sodium monoxide content (calculated as $Na_2O + 0.658 K_2O$) exceeding 0.6% may not be used in any reinforced concrete other than in combination with an approved coarse aggregate, which has been shown by testing to be non-reactive in respect of potential alkali-aggregate reaction. Sulphate Resisting or Low Alkali Portland Cement complying with the abovementioned criteria must be used with any other approved coarse aggregate.

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

PSG 3.2.2 ALTERNATIVE TYPES OF CEMENT

Add to sub clause:

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 3.2.2 STORAGE OF CEMENT

Add to the Sub-Clause:

Cement shall not be kept in storage for longer than 8 weeks without the Employer's Agent'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 cement showing signs of hydration shall be removed from site.

PSG 3.4 AGGREGATES

PSG 3.4.1 APPLICABLE SPECIFICATION

Add to the Sub-Clause:

Fine aggregate must be clean, naturally occurring siliceous sand. The broken shell content determined in accordance with SANS Method 5840 must not exceed 30 percent in the case of 26.5mm aggregate size and 25 percent in the case of 19.0mm aggregate size respectively.

The results of grading analysis tests on all the aggregates shall be kept. Sand from a source selected by the Contractor and approved by the Employer's Agent after testing by the Contractor, will be used under this Contract. Fine and coarse aggregates must comply fully with the requirements of SANS 1083.

The maximum variance of the fineness modulus (FM) of the fine aggregate shall not exceed 0.2 .

PSG 3.4.2 USE OF PLUMS

Add to the Sub-Clause:

The use of plums will not be permitted in any of the strength concrete specified on the Works.

PSG 3.5 ADMIXTURES

PSG 3.5.1 APPROVAL OF ADMIXTURES REQUIRED

Delete and add the following to Sub-Clause:

The use of admixtures that improve workability and water retention will be approved subject to compliance with the following standards:

Chemical admixtures: AASHTO M194 "Chemical Admixtures for Concrete"

PSG 4 PLANT

PSG 4.2 BATCHING PLANT

Add to the Sub-Clause:

Reports on calibration of weigh batching plant, clearly stating the date of the test shall be submitted to the Employer's Agent.

PSG 4.5 FORMWORK

PSG 4.5.1 DESIGN

Add to the Sub-Clause:

The Contractor shall arrange for a Professional Employer's Agent to design and sign the drawings for the formwork. The formwork shall be designed to limit deflection to a value not exceeding $1/360^{\text{th}}$ of the span between supports.

PSG 4.5.2 FINISH

Delete the Sub-Clause and substitute with the following:

The quality of the finished surfaces of the concrete shall be as shown on the drawings. Generally all surfaces are to be smooth, and only those surfaces which will be covered under permanent backfill may be cast using rough shutters.

PSG 4.5.3 TIES

Add to the Sub-Clause:

The spacing and method of fixing shutters and filling of voids shall be subject to the approval of the Employer's Agent.

Metal ties shall be placed in a plastic sheath with plastic cone plugs on either end to allow easy removal of the tie. Once the shutters are removed, the cone plugs shall be removed and the metal ties withdrawn. A heated reinforcing rod shall then be inserted into the plastic sleeve to allow removal of the sleeve. The voids left in the concrete once the ties and sleeves are removed, shall be thoroughly cleaned out, filled with an expansive grout and thoroughly compacted with a reinforcing rod.

The use of non-recoverable metal ties cast into the concrete member is preferable. In the case of water retaining structures the non-recoverable ties shall be supplied with a centrally welded water bar. The cone holes shall be cleaned of laitance, primed with cement wash, in-filled with a sand cement mix of equivalent proportions and strength as that of the concrete and trowel finished to blend with the shutter finish.

PSG 5 CONSTRUCTION

PSG 5.1 REINFORCEMENT

PSG 5.1.2 FIXING

Add to the eighth line the following:

"... displacement by tying at intersections with double annealed wire"

Delete from the eighth and ninth lines the following:

"or, if permitted by the Employer's Agent, by welding".

PSG 5.1.3 COVER

Add to the Sub-Clause:

Binding wire used for fixing reinforcement must be tightly bound around the nodes at bar intersections with cut ends bent inwards. A nominal reduction of the minimum specified cover by 3mm will be allowed for binding wire.

The Contractor shall use only high quality cement mortar cover blocks to maintain the specified cover to reinforcement. Mortar must be made using the same quality cement as specified for strength concrete and mixed in the same cement/sand proportions as employed in the concrete elements in which they are placed. Cover blocks shall not be less than 7 days old at time of installation and shall have been cured by full immersion in water for a period of not less than 3 days.

Plastic cover blocks shall not be allowed.

Where pipe work is constructed through valve chamber walls, the minimum distance between any portion of the pipe and the reinforcing will be 200mm.

PSG 5.2 FORMWORK

PSG 5.2.1 CLASSIFICATION OF FINISHES

Add to the Sub-Clause:

Table 5 (not to be confused with table 5 SABS 1200G 5.5.1.5)

CLASS	DESCRIPTION OF FINISH	USE IN WORKS
F1	As from loose jointed sawn boards, sheet metal or other approved material which will prevent grout loss.	Surfaces below ground not exposed to view and other surfaces indicated on the drawings.
F2	As from wrought formwork with all joints between formwork panels horizontal or vertical or parallel to supporting members to produce a high quality, smooth finish of uniform texture and colour. Joints shall be tight to prevent loss of grout. Groutex or similar is to be fitted between formwork panels.	All surfaces in contact with water; all surfaces exposed to view and other surfaces indicated on the drawings or as directed by the Employer's Agent.

The making good of imperfections defined for smooth surface finish formwork must include filling blowholes with any dimension exceeding 10mm.

Full payment for formwork will only be made when concrete has been finished to the standard specified.

PSG 5.2.2 PREPARATION OF FORMWORK

Add to the Sub-Clause:

All formwork must be treated with a release agent which is compatible with the concrete surface finish specified. Details of the proposed release agent shall be submitted to the Employer's Agent for his approval, prior to its use on site.

All exposed external corners shall have 20mm x 20mm chamfers.

Shutter release agent is not to come into contact with reinforcement bars.

PSG 5.2.5 REMOVAL OF FORMWORK

PSG 5.2.5.2 PERMISSIBLE TIME FOR REMOVAL OF FORMWORK

Delete the first two lines and substitute with the following:

For this purpose and except as allowed in SABS 1200G 5.2.5.3, the formwork shall remain in place, after all the concrete has been placed in the relevant lift, for the appropriate minimum period of time given in Table 2.

Formwork shall be removed at the earliest time permitted according to Table 2, taking prevailing weather conditions and temperatures into account, in order to limit temperature rise in the concrete due to heat of hydration.

PSG 5.3 HOLES, CHASES AND FIXING BLOCKS

Add to the Sub-Clause:

Fixing blocks for the attachment of fixtures may be embedded in concrete provided that the strength or any other desirable feature (such as appearance) is not in the opinion of the Employer's Agent, thereby impaired.

PSG 5.5 CONCRETE

PSG 5.5.1 QUALITY

PSG 5.5.1.1 GENERAL

Add to Sub Clause:

Unless specifically specified in the Project Specification, Prescribed Mix Concrete will not be used.

PSG 5.5.1.1 CONSISTENCY

Delete (b) and substitute with:

....by the Employer's Agent in respect of prescribed mix and strength concrete, or...

Add to the Sub Clause:

Slump limits specified in Table 3 shall apply except for slabs where maximum slump must not exceed 60mm.

PSG 5.5.1.5 DURABILITY

Add to the Sub-Clause:

The exposure conditions at the site of the Works are to be considered as being severe.

PSG 5.5.1.6 PRESCRIBED MIX CONCRETE

Delete Sub Clause and replace as follows:

Unless the design mix is detailed in the drawings and project specification, all concrete shall be Strength concrete.

PSG 5.5.1.7 STRENGTH CONCRETE

Add to Sub Clause:

The concrete mix design is to be design by an approved laboratory.

The contractor shall allow in his rates for the design requirements and the transportation of materials to the laboratory for testing as required for the design.

PSG 5.5.1.8 NO FINES CONCRETE

Add new Sub Clause:

No fines concrete shall consist of cement and coarse aggregate only with the fine aggregate having been omitted.

The stone shall comply with the grading requirements of 19mm single sized crushed stone of table 7 of SANS 1083.

Only sufficient water shall be applied to produce a smooth grout to completely cover each and every coarse aggregate particle.

No fines concrete shall be placed within 20 minutes of having been mixed and shall be hand tamped into position.

No traffic shall be allowed to traverse no fines concrete after having been placed.

The upper surface of place no fines concrete shall be wood float finished to provide a smooth surface whilst adding just enough cement mortar of approx. 1 in 8 mix to close the upper surface of voids to prevent ingress of foreign matter into the interstices.

PSG 5.5.3 MIXING

PSG 5.5.3.1 MIXING AT CONSTRUCTION SITE

Add to the Sub-Clause:

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

PSG 5.5.3.2 READY MIXED CONCRETE

Delete the first sentence and substitute the following:

Concrete produced at a central facility, other than at the site of the Works, shall not be accepted for use in the Works except with the prior written approval of the Employer's Agent. When such approval has been given, only concrete cubes prepared on site and crushed by an independent laboratory will be accepted. Slump test will be done on site for every delivery. (refer to SANS 878 for slump testing)

PSG 5.5.5 PLACING

PSG 5.5.5.5 DROPPING OF CONCRETE

Delete the Sub-Clause and substitute the following:

Dropping concrete freely will only be permitted if the Employer's Agent is satisfied that this is the only practical method of placing.

PSG 5.5.5.9 PUMPING OF CONCRETE

Delete the Sub-Clause and substitute the following:

The placing of concrete by pumping will not be permitted without the written approval of the Employer's Agent. The design concrete mix has to be approved by the Employer's Agent should pumping be allowed.

PSG 5.5.5.10 CONTINUOUS POURS (NEW SUB-CLAUSE)

Add new Sub-Clause:

In the case of continuous walls, these are to be cast in lifts of such height that each lift can be poured uninterrupted in one continuous operation over the entire perimeter of the wall. No vertical or inclined construction joints of any kind will be permitted in continuous walls unless they have been specifically ordered or authorized by the Employer's Agent. The placing of concrete shall commence at convenient points on the perimeter of the wall and shall proceed both ways simultaneously so that fresh concrete meets fresh concrete. Any rest pauses, such as for meals, shall be avoided as far as possible, and the Contractor may be required by the Employer's Agent to make the operation continuous by working in shifts. A workable arrangement must be made before each concreting operation commences.

PSG 5.5.5.11 BLINDING LAYER (NEW SUB-CLAUSE)

Add new Sub-Clause:

Beneath all structural grades of concrete, or where shown on drawings or elsewhere if so ordered by the Employer's Agent, the bottom of the excavation is to be covered by a blinding layer (screed) in Grade 10/19 concrete to a depth of 75mm (or 50mm in some instances) to prevent disturbance of the ground and to serve as an even, clean and accurately positioned working floor for setting steel and placing foundation concrete. This blinding layer shall be laid immediately after excavations have been completed, trimmed to the required depths and have been inspected and approved by the Employer's Agent.

PSG 5.5.7 CONSTRUCTION JOINTS

PSG 5.5.7.3 PREPARATION OF CONSTRUCTION JOINTS

Delete Sub-Clauses (a), (b), (c) and (d) and substitute:

PSG 5.5.7.3.1 SURFACE PREPARATION OF CONSTRUCTION JOINTS (NEW SUB-CLAUSE)

Add new Sub-Clause:

All horizontal and vertical construction joints shall be cleaned of all dirt and loose particles and shall be prepared to the satisfaction of the Employer's Agent. Formed keys shall be provided if shown on the drawings or if instructed by the Employer's Agent. All intersections of construction joints with concrete surfaces which will be exposed to view shall be made straight and level or plumb and shall be constructed to the details shown on the drawings.

The Contractor is to provide a compressor with suitable oil traps in the air delivery hoses on site for the whole period during which concreting is in progress, and this must be available for cleaning concrete faces prior to placing fresh concrete or pouring joints.

“Blowing off” may generally be carried out on horizontal surfaces but under special circumstances approved by the Employer’s Agent it may also be carried out on vertical surfaces. The surface concrete to be prepared shall be between 4 and 8 hours old after completion of placing and shall be blown off using a mixture of air and water under a pressure of at least 500 kPa or by using a high pressure water jet until all dirt, laitance, etc. is removed and particles of clean coarse aggregate are exposed sufficiently to produce a rough surface. Any loose particles of coarse aggregate shall also be removed. The success of this method of preparation depends on selecting the correct time (dependent on the type of cement, atmospheric conditions etc.) so that the concrete has set to just the necessary degree of hardness. The operation may therefore have to be undertaken outside normal working hours and at night. When the surfaces are at least 12 hours old any remaining loose fine aggregate particles shall be washed off.

“Scabbling”, which refers to removal of all surface laitance plus roughening the concrete surface with (pneumatic) picks in order to expose the coarse aggregate in a uniform pattern, may be carried out on both horizontal and vertical surfaces. The surfaces to be prepared in this manner shall be at least 12 hours old after mixing the concrete. At least 35% of the roughened surface area shall consist of exposed coarse aggregate.

All surfaces prepared either by “blowing-off” or by “scabbling” shall be kept continuously wet until the next lift of fresh concrete is to be placed against them; the minimum time being 12 hours.

The use of approved wet-to-dry epoxy resin concrete adhesive, strictly in accordance with the manufacturer’s instructions, will be permitted in the formation of concrete joints at surfaces where the concrete is older than 7 days.

PSG 5.5.7.3.2 PLACING FRESH CONCRETE AT CONSTRUCTION JOINTS (NEW SUB-CLAUSE)

Add new Sub-Clause:

Horizontal and vertical construction joint surfaces shall have been “scabbled” or “blown-off”, cleaned and continuously wet as specified above before fresh concrete is placed over them. Immediately before placing the fresh concrete, the damp surface of the set concrete shall be evenly coated (by brushing or brooming) with a layer of cement mortar between 10mm and 15mm thick. The water/cement ratio and the cement/sand ratio of this mortar shall be the same as that of the fresh concrete to be placed. This mortar shall be produced by leaving the coarse aggregate fraction out of a batch of the fresh concrete. Coating with mortar is to be done in stages immediately before areas of set concrete are covered with fresh concrete, so that no mortar is exposed for longer than one hour after mixing, or less if the mortar has become dry or has started to set before being covered with fresh concrete. Any dried out mortar shall be removed and after cleaning the surface, shall be replaced with fresh mortar.

No fresh concrete shall be placed on the top surface of concrete which is laterally restrained (e.g. by formwork or by in-situ earth) while the top layer of concrete is between 3 hours and 12 hours old after mixing. No fresh concrete shall be placed on top of the concrete with an unrestrained lateral surface while the top layer of concrete is between 2 hours and 12 hours old after mixing.

PSG 5.5.9 ADVERSE WEATHER CONDITIONS

PSG 5.5.9.2 HOT WEATHER CONCRETING

Delete the first two sentences and substitute:

When concrete operations are being carried out at ambient temperatures in excess of 32°C, the Contractor shall apply the relevant recommendations for hot weather concreting set out in American Concrete Institute publication ACI 305R-77 "Recommended practice for hot weather concreting".

PSG 5.5.10 CONCRETE SURFACES

PSG 5.5.10.2 UNFORMED CONCRETE SURFACES

Add to the Sub-Clause:

The unformed surfaces that require to be wood-floated or steel-floated or which are to receive other special treatment as well as the degree of accuracy, if this is not Degree of Accuracy II, are as indicated on the drawings. Generally, all unformed surfaces are to be steel-floated.

Table 6

Class	Description of Finishes
U3	Finish to horizontal or slightly inclined surfaces of concrete struck with an accurate straight edge to provide an even uniform surface and wood floated to remove screed marks (tolerance $\pm 3\text{mm}$ unless otherwise specified).
U4	As in U3, but using either a steel float or power float.

PSG 5.5.12 CONCRETE IN WET GROUND

Delete the Sub-Clause and substitute with:

The Contractor shall be fully responsible for keeping the excavations free from water whilst the construction work is being carried out. The methods by which he proposes to achieve this shall be approved by the Employer's Agent before being implemented. The cost of dewatering shall be included in the tendered rates for the construction work and no separate payment shall be made for such dewatering throughout the construction period.

PSG 5.5.13 GROUTING

Add to the Sub-Clause:

Grouting shall be done to the instruction of the Employer's Agent using materials of suitable consistency as follows. Unless otherwise directed, grouting mixtures shall consist of 1 part cement to 2 parts concrete sand by volume, well mixed and with sufficient water added to obtain the required consistency. Where recesses to be filled are of appreciable dimensions, the Employer's Agent may direct the Contractor to replace a proportion of sand with fine stone to reduce shrinkage. The Employer's Agent may also require the Contractor to use non-shrink or other additives in grouting mixtures.

PSG 5.5.13.1 GROUTING OF PIPES/SPECIALS THROUGH WALL (NEW SUB-CLAUSE)

Add new Sub-Clause:

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

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

Remove all shuttering and boxing remaining in the holes

Make any alterations required to the position and shape of the holes and reinforcing steel (lacing bars, etc) in the holes

Thoroughly clean and scabble the sides of the holes so as to obtain satisfactory bond surface for the new concrete

Ensure that the reinforcing will be a minimum distance of 200mm from the pipe. Where puddle flanges are required and the chamber wall specifically acts as anchor block, the requirements of the drawings in so far as reinforcement spacing is to be adhered to.

After accurately positioning the pipes/specials in the respective holes, the Contractor shall fix the pipes/specials in a suitable manner to prevent movement.

Immediately prior to grouting being 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 12mm thick, of mortar consisting of 3 parts concrete sand and 1 part 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 as a standby measure 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 5.5.13.2 DRY PACKED GROUT (NEW SUB-CLAUSE)

Add new Sub-Clause:

When dry-packed grout is specified under base plates etc., only sufficient water shall be added to the mixture to make a ball when squeezed in the hand. Before any grouting is done with dry caulking, the surfaces between which the caulking is to be placed shall first be thoroughly cleaned and flushed with water. All surplus visible water shall be wiped or blown away and the dry caulking shall be forcefully rammed or hammered into place using suitable tools. Exposed surfaces shall be finished off neatly with a trowel and extensive exposed areas shall be covered with wet sacking and kept damp for at least 24 hours.

Where additives are required for grouting operations, these shall be brought on to site in the manufacturer's unopened containers and used strictly in accordance with the manufacturer's instructions. The Contractor shall undertake preliminary tests to check the behaviour of proprietary additives under the conditions pertaining to the site.

PSG 5.5.13.3 EPOXY GROUT (EPOXY MORTAR TYPE ONLY) (NEW SUB-CLAUSE)

Add new Sub-Clause:

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

PSG 5.5.14 DEFECTS

Add to Sub-Clause:

Any defects in the concrete or surface finishes must be inspected by the Employer's Agent immediately after stripping of formwork. Remedial works to defects, where authorised by the Employer's Agent, shall be carried out strictly in accordance with his directives and shall be at the Contractor's expense.

Localised minor imperfections (e.g. blow holes, small recesses etc.) shall be made good by rubbing in a stiff 1:2 cement mortar immediately after stripping of formwork. Curing compound shall not be applied to these areas. Once the repair work has set, curing compound and curing membrane shall be applied to the area within 24 hours of stripping formwork.

All other remedial work shall be carried out in dry conditions after the concrete is fully cured. Defective material shall be cut out and contact surfaces to which new concrete shall be bonded shall be cleaned by sandblasting. Repairs shall be made with an epoxy mortar with an appropriate 2 part epoxy primer on concrete or a wet to dry epoxy adhesive, depending on the extent of the defect.

All epoxy resin compounds used in repair work must be approved by the Employer's Agent and applied strictly in accordance with the manufacturer's specification. The Contractor shall match the colour of repair work with existing concrete where repair work is permanently exposed.

PSG 5.5.16 CEMENT MORTAR (NEW SUB-CLAUSE)

Add new Sub-Clause:

Where cement mortar is specified for filling around pipes etc, water shall be added to obtain a firm paste which can be worked with a trowel but is not fluid. Surfaces to receive mortar shall be well wetted and excess water allowed to drain or be removed. The mortar shall be worked into place with a trowel or tamping rod, exposed surfaces floated off and covered with wet hessian for 24 hours and allowed to harden without disturbance.

PSG 5.5.17 MANHOLE COVERS AND FRAMES (NEW SUB-CLAUSE)

Add new Sub-Clause:

The rates are to include for setting the covers into concrete with the upper edge 10mm above the concrete level to prevent the entry of rainwater where installed in positions exposed to rain and set into concrete so as to be flush with the concrete surface.

The work is also to include for the thorough cleaning and painting of all exposed portions or as directed by the Employer's Agent, repaired using cold galvanising systems like "zinga" or similar approved as per the manufacturers specification.

PSG 6 TOLERANCES

PSG 6.2 PERMISSIBLE DEVIATIONS

PSG 6.2.3 SPECIFIED PERMISSIBLE DEVIATIONS

Add to the Sub-Clause:

Except for the special smooth finish described in PSG 5 above, where applicable, the Contractor shall work within the limits of the permissible deviations laid down for Degree of Accuracy II with the following modifications:

- Foundations (Sub-Clause 6.2.3(c))
- Position on plan $\pm 20\text{mm}$
- Surface level $\pm 10\text{mm}$
- Above Foundations (Sub-Clause 6.2.3(d))
- Position on plan $\pm 10\text{mm}$
- Surface level $\pm 5\text{mm}$

If deviation length can not be measured over a 3m length, the longest possible length shall be used.

PSG 7 TESTS

PSG 7.1 FACILITIES AND FREQUENCY OF SAMPLING

PSG 7.1.2.3 FREQUENCY OF SAMPLING

Add to the Sub Clause:

Samples of concrete as actually placed in the structure shall be taken at the point of discharge from the mixer at a random on eight separate occasions during each of the first five days of using that mix on site.

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 on sample on each day that concrete of a particular grade is made.

Notwithstanding the schedule as stated, the Contractor shall arrange exact details of numbers of samples to be taken with the Employer's Agent at commencement of construction.

PSG 7.1.2.4

Delete this Sub Clause

PSG 7.2 TESTING

PSG 7.2.1 GENERAL

Add the following:

In the event of any failure, the Contractor is responsible to ensure that tests are carried out according to the appropriate SANS methods and he shall bear all the costs incurred as a result of testing deemed necessary. The tests shall establish the true strength of the in-situ concrete, to meet the criteria set out in SANS 1200 G

sub-clause 7.3 or any other specified criteria. An inappropriate method of testing will not be accepted as a reason for any failure of any concrete to pass the required strength tests.

PSG 7.2.3 LABORATORY TESTING

Add to the Sub-Clause:

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 on site in an approved curing tank. After curing, the cubes are to be tested by an independent laboratory approved by the Employer's Agent.

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 where the concrete batch represented by the cube tests was placed. 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 7.2.5 TESTING GROUTING PROCEDURE (NEW SUB-CLAUSE)

Add new Sub-Clause:

SANS 0120: Part 2 Section G, page 9, Sub-Clause PSG 9.10 shall be applicable where relevant.

PSG 7.3 ACCEPTANCE CRITERIA FOR STRENGTH CONCRETE

Add to the Sub-Clause:

The cube results for each grade of strength concrete (tested at the specified age) will be grouped in batches of forty in chronological order as they become available and analysed statistically by the Employer's Agent who will calculate the mean strength and the standard deviation.

If the mean strength minus 1.64 times the standard deviation thus calculated is not less than the specified cube strength, the concrete represented by the batch of test results shall be deemed to comply provided always that no single cube result is less than 90% of the specified cube strength. If the average of such test results fails to meet this requirement, the mix design shall be adjusted to ensure compliance with these criteria. In addition, the mean strength of failed concrete work already cast shall be raised to an acceptable level by recommencing curing in a manner to be prescribed for a period determined by the Employer's Agent. Suspended concrete work shall be re-propsed and the application of finishes and other superimposed loads may be delayed if the Employer's Agent so orders. After additional curing, the "failed" concrete shall be examined in accordance with Sub-clause 7.3.4 of SANS 1200G.

If any single cube result is less than 90% of the specified cube strength, then the section of the concrete represented by the cube in the structure will be subject to rejection at the Employer's Agent's discretion after examination in terms of clause 7.3.4 of SABS 1200G.

The Employer's Agent may approve slight adjustments to the mix if the mean strength of the cube tests minus 1.64 times the standard deviation exceeds the specified cube strength by more than 10% by either reducing the cement content or increasing the water/cement ratio, provided that no detrimental change in the conditions of control exercised during manufacture and delivery of the concrete takes place.

In order to comply with the durability requirements of the concrete, increased water/cement ratios for adjusted concrete mixes shall not exceed the maximum values for strength concrete mixes.

PSG 8 MEASUREMENT AND PAYMENT

PSGA 8.1.2 REINFORCEMENT

Add the following to Sub-Clause:

In addition to the requirements of SABS 1200G the Contractor shall allow in his rates for curving bars to required radius, where required.

PSG 8.1.2.2(a) REINFORCEMENT

Delete the second paragraph and substitute with:

The quantities (or percentages) of all other sizes of steel bars that are scheduled may be subject to variations and the contract prices for these will be fixed regardless of the magnitude of such variations (if any).

PSG 8.1.3.1(B) OVERBREAK

Delete the Sub-Clause and substitute with:

The scheduled rate for overbreak in hard rock excavation to structures shall include, inter alia, for the excavation of material, cleaning, washing and brushing with grout and for refilling with Grade 10/20 concrete together with all necessary shuttering and including the additional thickness of 50 mm to the concrete in lieu of blinding on horizontal floors. The Contractor is to make his own estimate of the extent of overbreak. The Contractor will not be paid for overbreak in intermediate or soft material.

PSG 8.2.6 BOX OUT HOLES/FORM VOIDS

Add to Sub-Clause:

Large, circular, of diameter greater than 0,7m up to 1,0m

Unit: No

Depths as in (a) above.

Large, circular, of diameter greater than 1,0m

Unit: No

Depths as in (a) above.

PSG 8.4.7 CONCRETE COMPLETE WITH FORMWORK – PRE CAST SLABS AND OTHER MINOR CONCRETE SLABS (NEW SUB-CLAUSE)

Add new Sub-Clause:

Separate items, where so required, have been included in the Bill of Quantities for concrete complete with formwork for each particular grade of concrete or for structural units of similar size and shape, or for both. The unit rates shall cover the cost of fixing the steel, the provision of concrete (made with Ordinary Portland Cement unless otherwise scheduled), mixing, testing, placing, compacting, the forming of stop-ends and unforeseen construction joints, forming of holes where required, striking off or levelling as applicable, and curing and repairing where necessary, together with the cost of all parts of formwork in contact with the concrete and the necessary

bearers, struts, and other supports, the provision of the required surface finish plus the layout and plant necessary to erect and strike such formwork.

The rate shall include for the casting into the concrete, of pipe work for breather pipes, security manhole covers or whatever is required in terms of the drawings for same.

The rate shall include for the placing onto position of precast slabs where applicable. Unit: m3

PSG 8.9 GROUTING OF PIPES/SPECIALS THROUGH WALLS OR SLABS (NEW SUB-CLAUSE)

Add new Sub-Clause:

Items, where so required, have been included in the Bill of Quantities for the grouting of pipes and specials through box-outs or broken out openings in walls or slabs. The rates shall include for all necessary labour, plant and materials required to carry out the work described in PSG 5.5.13 and for finishing to the required quality. Quantities specified by size of pipe Unit: No

PSG 8.10 CASTING OF PIPES/SPECIALS THROUGH WALLS OR SLABS (NEW SUB-CLAUSE)

Add new Sub-Clause:

Items, where so required, have been included in the Bill of Quantities for the casting of pipes or specials through walls or slabs. The rates shall include for all labour, plant and materials to make the necessary modifications to formwork to allow the pipe or special to be cast in, the positioning of the pipe or special and for finishing the concrete surface to the required quality around the pipe or special at the end of the concreting operation Unit: No

PSG 8.11 GROUTING STEEL PIPE INSIDE CONCRETE JACKED SLEEVE (NEW SUB-CLAUSE)

Add new Sub-Clause:

The rate shall include for the supply, mixing and application of the grout as per the relevant drawings, prevention of the steel pipe from floating and the curing of the grout, inclusive of the sealing off of the voids to be grouted. Unit: m3

PSG 8.12 CONCRETE RETAINING BLOCK WALLING (NEW SUB-CLAUSE)

Add new Sub-Clause:

The unit of measure shall be the square metre of walling measured vertically from the top of the foundation to the top of the wall .Unit: m2

The rate is to include for the supply and placing of the specified block type and size including the construction of the concrete base, compaction of the fill placed in and 300mm behind the blocks. The rate to include for all plant, labour, materials and incidentals necessary to carry out the work.

The tendered rates shall include for the Employer's Agenting design by the supplier as well as the issuing of an Employer's Agenting certificate of approval by the Contractor, to the Employer's Agent.

DRAFT DO NOT USE

PSHA STRUCTURAL STEELWORK (SABS 1200 HA – 1990)

PSHA 5 CONSTRUCTION

PSHA 5.1.2 Contractor to Provide Shop Details

Add to the Sub-Clause:

The Contractor shall prepare his own shop details based on the dimensions and details given on the drawings and will be required to submit his shop details to the Employer's Agent at least 3 weeks prior to fabrication. Written consent must be obtained from the Employer's Agent, prior to commencing fabrication. The Contractor is still responsible for ensuring that the shop details are dimensionally correct.

PSHA 5.2.10 Protective Treatment

Add to the Sub-Clause:

All mild steel shall be heavy duty hot dip galvanised except where shown to the contrary on the drawings or in the schedule of quantities. Hot-dip galvanising shall conform to SANS 763 for heavy duty coatings or equivalent.

Screwed and socketed tubing shall be galvanised in compliance with BS 1387. Galvanised malleable cast iron fittings shall comply with SANS 509.

All paint shall be delivered at the workshop as well as on the site in the original containers that display the manufacturer's name and trademark as well as the SABS mark. The Employer's Agent may, at his discretion, prescribe the manufacturer and the type of paint.

The coating system shall be from one manufacturer only. The paint manufacturer's instructions shall be strictly adhered to.

Surfaces in contact with each other after assembly or erection shall receive the primer beforehand, except for faying surfaces for friction-grip fasteners.

The application of the final coats of paint before erection will be permitted by the Employer's Agent only in special circumstances or where specified elsewhere.

After erection of the steelwork, the specified paint system shall be reinstated in all areas where it has been damaged. All fasteners shall also be treated in accordance with the specified paint system.

No painting on the site shall be done in inclement weather or when humidity or frost is liable to cause wet or damp conditions on the surface to be painted.

No painting shall be done if the temperature falls below 7 °C.

Welded seams shall be thoroughly steel brushed before painting. Permission shall be obtained from the Employer's Agent before slag residue may be neutralized with acids or alkalis

Surface preparation in the workshop

SIS 05 59 00 or ISO 8501 shall apply and shall be referred to in respect of this clause.

Manual scraping and wire brushing

This treatment shall normally be applied in all circumstances except if and where blast cleaning is specified.

- Prior to treatment, the steel surface shall be cleaned of dirt and grease.
- Heavier layers of rust shall be removed by chipping.

- All loose mill scale, rust and foreign matter shall be removed by very thorough scraping, wire-brushing, machine-brushing, grinding, etc.
- Finally, the surface shall be cleaned by vacuum cleaner, with clean dry compressed air, or with a clean brush.
- The surface shall have a pronounced metallic sheen with an appearance equal to or better than that shown on the prints designated ST 3 in SIS 05 59 00 or ISO 8501.

Blast-cleaning

This treatment may be used but is not obligatory unless so specified hereinafter. If blast cleaning is preferred to normal scraping and wire brushing, the final surface shall be equal to or better than that specified in sub sub-clause 3.1.2.1.

Paint system

The paint system shall be applied in accordance with the specifications given in table 3.1 below. Application may be by brush, roller or sprayed. Red lead may not be used.

All structural steel which is not visible, eg purlins, rafters and trusses, shall receive only the primer coat. All visible steel shall receive the full appropriate paint system treatment.

In all cases the manufacturer's specification for any paint product must be followed.

Table 3.1: Paint system for new steel surfaces for unpolluted inland environments (not suitable for temperatures above 90 °C)

Coat No	Place of application	Time of application	Min thickness in mm	Types	SABS-Specification
1. Primer	Workshop	Within 4 hours of surface treatment	50	Zinc phosphate Plascoprime 182 QD (Plascon) or D193-1029 (Dulux)	(None)
2. Two final coats; colour as specified elsewhere	Site	After erection. 2nd coat within 48 hours of 1st	Each coat 25 to 40	High-gloss enamel or structural steel paint	630 Type I 684 Type A

Paint system for newly galvanized surfaces

Recommended surface preparation:

- Degrease with Plascon Aquasole Degreaser GR 1 or similar approved. Any cement or foreign material must also be removed from the metal surface.
- Rinse with clean running water while protecting the floors and walls.
- Wash with Galvanised Iron Cleaner GIC 1 by Plascon, or similar approved.
- Rinse with clean running water and allow to dry. Protect the floors and walls.

Apply one coat of Plascon Aquafast Etch Primer no EMS 18 or similar approved to a total dry thickness of 35 micron. Must be overcoated within 72 hours to avoid excessive hardening.

Two final coats as specified in table 3.1

HOT DIPPED GALVANIZING (See also subclause 5.9 in SABS 1200H)

Steelwork described as "hot dipped galvanised" shall be galvanised after manufacturing and before delivering to site by means of the hot dipped process complying with the minimum requirements of SABS ISO 1461, 2000 latest amendment. Structural steel members shall be given an 85micron thick galvanised coating or such other thickness as may be specified in accordance with SABS ISO 1461. (Table 1)

Damaged surfaces must be thoroughly cleaned and if welding has been carried out all slag must be removed preferably by the use of a chisel hammer.

Before galvanising all surfaces of the metalwork shall be thoroughly cleaned of all scale and rust by shot blasting in accordance with SANS 064 or by pickling and then fluxed ready for galvanising.

The zinc coating shall be even and continuous over all surfaces, free of bare spots, dull or rough patches, blisters or other imperfections. The zinc coating shall show no signs of peeling and shall be uniform in thickness.

All M8 and greater bolts, nuts, screws and other threaded components, shall be hot dip galvanised to SANS ISO 1461 (previously articles type C).

Repairing of damaged coatings

Plant repairs

Should any black spots or uncoated areas greater than 5mm² (individual) or 25mm² (collective) per m² or per m run be present after galvanizing, the coating shall be repaired. This is to be carried out using abrasive blasting following by zinc metal spray. The zinc metal spray shall be applied at least 25 % thicker than that specified and shall overlap the damaged area by 20-25mm. The finished coating shall be wire brushed to remove any excess metal spray.

Hot patch soldering is an alternative at the plant but is seldomly used, as the method needs to be conducted while the product is still hot before quenching.

Site Repairs

Zinc metal spray as set out above.

The recommended alternative is to use a zinc rich paint provided it has at least 90 % zinc in the dry film, by mass. The paint should be a zinc rich epoxy in conformance with SABS 926. A single pack zinc rich paint such as Plascon's "Plascozinc Polygalv Primer" or equal, can be applied.

PSHA 5.2.11 Pipe Clamps and Brackets (New Sub-Clause)

Add new Sub-Clause:

Clamps and brackets around pipes are to be constructed to the details shown on the drawings and are to be provided with all necessary bolts for fixing to concrete.

PSHA 5.3.6 Grouting

Add to the Sub-Clause:

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

PSHA 6 TOLERANCES

PSHA 6.1.3 Accuracy of Erection

Add to the Sub-Clause:

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

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

PSHA 7 TESTING

PSHA 7.1 TEST CERTIFICATES

Delete the part sentence "in terms of the project specification" from the wording of the Sub-Clause and add the words "when so requested by the former" at the end of the sentence. The Employer's Agent shall be afforded the opportunity to inspect shop manufactured steel works at the factory.

PSHA 8 MEASUREMENT AND PAYMENT

PSHA 8.3 SCHEDULED ITEMS

Add the following introduction to the subsequent Sub-Clauses:

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

Where the scheduled items for steelwork include corrosion protection, then the price stated shall also include for such protection as specified in SABS 1200HC. Similarly, the materials and corrosion protection for nuts, bolts, washers etc shall match the steelwork ordered.

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

PSL MEDIUM PRESSURE PIPELINES (SABS 1200 L – 1983)

(Applicable to SABS 1200 L – 1983)

NOTE: Any specification under these amended specifications which are in conflict with the Umgeni/Mhlathuze Standard particular specification, shall see the amended specification taking preference.

PSL 3 MATERIALS

PSL 3.1.1 Materials control (New sub-clause)

Add new Sub-Clause:

PSL 3.1.1.1 Checking material lists and drawings (New sub-clause)

Add new Sub-Clause:

Not more than 4 weeks after the contract has been awarded, the Contractor shall check the Materials Lists against the drawings and advise the Employer's Agent in writing of any shortages or omitted items. This applies to free issue items, if issued.

If any variations in the contract is authorized, the Contractor shall ensure that any additional items to be supplied by the Employer and the Contractor, are ordered in good time so as not to cause delay to the works.

The Contractor shall check the delivery timing of all pipe and fittings and ensure that it is in line with the Contract programme. Any critical items that could be delivered late are to be brought to the attention of the Employer's Agent.

The delivery status of materials is to be checked and followed up upon by the Contractor throughout the contract.

PSL 3.1.1.2 Materials control – general (New sub-clause)

Add new Sub-Clause:

The Contractor is held responsible for the inspection and control on site of all the pipe supplied as free issue materials for the duration of the contract. Once pipe material and equipment has been accepted, any subsequent damage shall be made good to the satisfaction of the Employer's Agent at the expense of the Contractor. Damage to internal linings and external coatings that are necessary and incidental to good welding practices and the manufacturing of pipe specials are excluded.

Any item damaged beyond repair shall, at the discretion of the Employer's Agent, either be replaced at the Contractor's expense or the value of the asset reimbursed in full to the Employer.

PSL 3.1.1.3 Material storage (New sub-clause)

Add new Sub-Clause:

The Contractor shall store all items to be incorporated into the Works so that no damage occurs whilst awaiting installation. Where practical, items are to be stored in containers for protection from the weather and pilferage.

All piping, pipe fittings, and equipment stored outside or awaiting installation are to be protected from the weather and storm water and soil wash, using plastic sheeting that is highly UV resistant and storing same on pre prepared concrete surfaces. Pipes taken over from the Employer shall receive the required attention in order to ensure safe storage in yards, protected from fires, vandalism and incidental damage that can reasonably be prevented.

PSL 3.1.1.4 Handling pipe, fittings and equipment (New sub-clause)

Add new Sub-Clause:

When handling pipes and equipment, strict supervision shall be maintained by the Contractor at all times. Pipe is to be lifted with a lifting beam and slings which shall be fitted at quarter points around the pipe. Due care shall be taken when fitting and placing slings to ensure that ancillary items do not get crushed during lifting. Pipe coating is to be protected by padding or otherwise from scuffing damage during lifting.

The equipment utilized for lifting pipes, must be approved by the Employer's Agent for the purpose of ensuring that the lifting equipment is appropriate and will not damage the pipe coating. It is not allowed to handle pipes with chains or any other device involving metal contact with the pipe coating.

The Contractor shall ensure that all lifting equipment complies with the relevant safety regulations.

PSL 3.1.1.5 Stacking of pipes and pipe spools (New sub-clause)

Add new Sub-Clause:

The Contractor shall take due care when stacking pipe or pipe spools at the workplace. Pipes must never be placed directly on the ground but shall be stacked on dunnage according to approved methods and shall be separated from one another with the use of applicable methods approved by the Employer's Agent.

PSL 3.1.1.6 Segregation of special items (New sub-clause)

Add new Sub-Clause:

All items/equipment which are to be used as paired items shall be marked as "special items" by the Contractor. Examples of this are valve mating flanges, flat faced flanges, etc.

The Contractor shall take special care when storing items that are marked "special items", in order to ensure that they are not utilized by mistake as bulk items.

PSL 3.1.1.7 Controlled issue of lined pipe (New sub-clause)

Add new Sub-Clause:

The Contractor shall establish a data base of free issue and or procured pipe material which will reflect each and every pipe number of pipe lengths under his control, together with the pipe data of each of the pipes, next to the pipe number. The pipe data will clearly indicate the grade of steel and the wall thickness for each pipe number. Any lengths of pipe or piece of pipe cut from a full length shall be able to be traced to original manufacturing data at all times.

The Contractor shall control the issue of lined pipe using cutting lists, in order to minimize scrap metal and avoid unnecessary field butts. The Contractor shall ensure that pipe identification marks are transferred in a controlled manner onto cut sections of pipe to ensure 100% future traceability. The cutting of pipes and the transferring of identification marks shall be carried out under the close supervision of the Contractor's Quality Control Officer. The Contractor shall, at any stage as required by the Employer's Agent, produce the pipe data base on site, in order for the Employer's Agent to verify the origin of section of pipe built into pipe specials.

The Contractor's rates for compliance with his obligations in terms of quality control shall be deemed to include for the establishment of the required data base and the control of pipe material on site.

The Contractor shall take note that any cutting of standard length of pipe, for the purpose of making the pipe more manageable in restricted areas, will not be compensated for by payment for additional field joints.

Free issue pipe shall be utilized optimally to reduce waste. Any pipe damage, to a point that the pipe length requires rejection for use, as a result of the Contractor manhandling pipe inappropriately, shall be noted and the Employer shall require financial compensation to the equivalent value of the asset value. The resultant scrapped pipe shall be removed from site at the Contractor's cost.

PSL 3.1.1.8 Scrap material (New sub-clause)

Add new Sub-Clause:

For Employer's free issue material, scrap metal shall be sold to scrap dealers at the best rate obtainable and the income generated from these sales shall be refunded to the Employer where such refund shall be consolidated in the following payment certificate, shown as a deduction. A consolidated summary sheet shall be added to the payment certificate for this purpose.

PSL 3.1.1.9 Employer supplied and contractor supplied material control (New sub-clause)

Add new Sub-Clause:

All materials must be checked and listed against their respective material and test certificates, to ensure that such materials can be readily identified and traced to its material certificates and listings.

PSL 3.1.1.10 Cleaning of the inside of pipe supplied by the Employer (New sub-clause)

Add new Sub Clause:

The Contractor shall, upon instruction of the Employer's Agent, clean the internal surface of pipe before incorporation of the Works. This might be required as a result of the duration of the pipe laid in the pipe yard before use. Payment clause is included in the BOQ.

PSL 3.1.1.11 Acceptance of pipes, fittings and materials – free issue materials (if applicable) (New sub-clause)

Add new Sub-Clause:

Before acceptance of any pipes, fittings or other items of equipment issued as free issue materials (where applicable), the Contractor is to carry out a thorough inspection to ensure that the materials have been delivered undamaged and are as ordered.

Pipes shall be checked for:

- Identification
- Certification
- Soundness of internal lining
- Ends beveled correctly
- Circumference according to specification and within tolerance
- Quantity agrees with advice note

Inspection of pipe fittings, valves and other equipment shall include but is not limited to:

- Identification
- Certification
- Material, schedule and rating
- Lining where specified
- Coating where specified
- Circumference according to specification and tolerance
- Damage to items - example flange faces

Defective items shall not be accepted, but marked, quarantined and immediately reported to the Employer's Agent.

If accepted, the Contractor shall take the required steps to ensure that all delivery documentation together with signed acceptance notes is filed in the construction dossier.

PSL 3.2 AC Pipes and Specials

Delete this Sub Clause and replace as follows:

Fibre Cement or Concrete Pipes and Specials

Pipe supplied shall conform to the relevant SANS 676 or SANS 677 specification.

Specials for use with concrete pipe shall be rated at not less than the pressure rating for the pipeline.

PSL 3.4 Steel Pipes, Fittings and Specials

PSL 3.4.1 General

Add to Sub-Clause:

Unless otherwise specified, steel pipes, fittings, flanges and specials of nominal bore over 200mm shall be coated and lined in accordance with one of the lining or coating systems described in the Umgeni Water Particular Specification for 219mm to 2230mm Diameter Steel Pipe, Specials, Coatings and Linings

The steel pipes to be laid under this contract is issued as free issue material with bevelled ends for butt welding to SANS 719 Clause 5.1 and SANS 719, figure 1 and will be Three-Layer Polyethylene (3LPE) coated on the outside and Solvent Free Epoxy lined internally.

Pipe lengths shall be as scheduled in the Bill of Quantities

Steel fittings and specials to be grade X42 coated and lined to project specifications. Plate thickness shall not be less than the pipe wall thickness or as shown the drawings or the thickness that results in a working stress not exceeding 75% of the allowable maximum working stress for the steel grade.

For all branch connections the plate thickness of the barrel and branch shall be such that the maximum stress shall not be greater than that for an uncut pipe of the theoretical minimum thickness. Where it is more economical to provide external reinforcement in the form of collar type rings or crotch plates, these forms of reinforcement shall be used to achieve the same results

General handling of pipe needs to be such that pipe material will not be stressed and pipe lining and coating shall not be damaged.

PSL 3.4.2 Pipes of nominal bore up to 150mm

Amend Sub-Clause as follows

Delete: "medium class, shall be screwed"

and substitute: "heavy class, shall have plain ends, shall be galvanized,"

The specified coating and lining on the drawings, if different to this clause, shall be applicable.

PSL 3.4.4 Fittings and Specials

Add to the Sub-Clause:

- The lining and wrapping of specials, which are to be butt-welded, is to be terminated 100mm from the end of the pipe. The lining of specials which are to be sleeve welded shall be taken to the end of the pipe and the wrapping is to be terminated 100 mm from the end. On flanged specials the wrapping and lining is to be taken to the end of the pipe.
- Square, plain faced ends where slip-on flanges are to be welded to the special
- All specials shall be protected in accordance with clauses PSL 3.9.8. All electrodes used for welding of joints shall comply with the relevant SANS standard.
- All steel bends, fittings and specials shall be fabricated to the dimensions and details shown on the drawings and/or described in the Bill of Quantities. If no dimensions given on drawings, then Tee pieces shall be fabricated in accordance with Table 9 of BS 534 (1990) and all other specials shall be fabricated in accordance with the relevant clauses of BS 534 (1990).
- All even curvature bends shall be long radius and fittings for diameters up to and including DN200 shall be in accordance with ASME/ANSI, B16.9. unless otherwise stated in the Bill of Quantities or drawings.
- All reducers to be cast reducers and shall be in accordance with ASME/ANSI, B16.9. unless otherwise stated in the Bill of Quantities or drawings. Any fabricated reducers shall be fabricated based on the formula: Face to Face length = $(D-d)*4$ where "D" is pipeline diameter and "d" is the diameter of the smaller diameter pipe/ fitting and shall not have more than two longitudinal weld seams.
- The bend, fitting, and special fabricator shall supply written confirmation that all hand welding was carried out by coded welders against appropriate welding procedures.
- Individual bends, fittings and specials up to and including DN200 shall be hot-dip galvanized to heavy duty grade in accordance with SABS 121:2000 after fabrication. Where a hot dipped galvanized fitting is to be fitted to a steel pipe or fitting with coating and lining, such fitment shall be with a flange where the flange has been hot dipped galvanized. Galvanised fittings and specials shall not be buried without appropriate corrosion protection.
- Bends, fittings, and specials DN350 and larger shall have the internal lining and external coating made continuous ("made good") as specified elsewhere for welded joints on coated and lined pipes.
- Bends, fittings and specials shall be manufactured and tested in accordance with the specification for straight pipe and additionally with Section 18 of BS 534. The nominal dimensions of each bend, fitting and special required are itemized in the Bill of Quantities and/or on the drawings and 'exact length' tolerances shall be adhered to.
- Bends shall generally be of the segmented (gusseted) type except where otherwise stated or shown on the drawings or where the Tenderer can offer a price advantage for supplying even curvature bends.

- All flanged bends, fittings and specials shall be hydraulically tested at the fabricator's premises to the same pressure that they will be subjected to during the hydraulic testing of the completed pipeline. No visible signs of leakage will be permitted.

PSL 3.4.4.1 FLANGES:

Add new Sub-Clause:

Use SANS 1123: 2007, Table 3 only. Where SANS 1123: 2007 (Table 3, for the different pressure classes) does not provide specifications for a particular diameter and class of flange, then specify BS EN 1092.

PSL 3.4.4.2 Segmented Bends

Add new Sub-Clause:

This clause applies to segmented bends equal to or greater than 300 mm in diameter. All segmented bends shall be fabricated in accordance with the criteria in Table 7.

For deflection angles up to and including 9 degrees, bends may be fabricated from pipe lengths "on site" in accordance with the Table below.

Deflection of Angle	
Up to and including 3 °	One pipe end scarfed on site
Exceeding 3 ° and up to and including 9 °	Mitre cut (two pipe ends scarfed on site)

Bends greater than 9° shall be fabricated at an approved pipe fabrication shop in accordance with the requirements of clause 21 of BS534:1990. Bends greater than 90° shall be fabricated from combinations of items from Table 7 below.

The maximum angular deflection at any mitre shall be 15 degrees and where the first and last segment are to be half of the maximum angle. Unless otherwise indicated on the drawings, the minimum radius of the segmented bends shall be:

- DN 300 to 450: According to Table 8 of BS 534 (1990)
- DN 500 to 1600: 2.0 x pipe diameters

All bends/ segmental bends shall be fabricated with:

- bevelled plain ends suitable for butt welding for pipelines greater than DN600
- plain faced ends where slip-on flanges are to be welded to the special

Shop drawings of bends, fittings and specials shall be submitted to the Employer's Agent for approval prior to manufacture.

All flanged bends, fittings and specials shall be hydraulically tested at the fabricator's premises to the same pressure that they will be subjected to during the hydraulic testing of the completed pipeline. No visible signs of leakage will be permitted.

All segmented bends shall be fabricated in accordance with the criteria in Table 7.

Table 7:

Total deflection angle	Number of segments	Number of Welds	Number of scarf cuts
0 to 3 degrees	N/A	1	1
Greater than 3, equal or less than 9	N/A	1	2
Greater than 9, equal or less than 15	2	1	0
Greater than 15, equal or less than 30	3	2	0
Greater than 30, equal or less than 45	4	3	0
Greater than 45, equal or less than 60	5	4	0
Greater than 60, equal or less than 75	6	5	0
Greater than 75, equal or less than 90	7	6	0

The pipe manufacturer shall obtain and make available to the Employer's Agent 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 and the cast numbers of the steel used.

PSL 3.4.5 Puddle collars and anchoring flanges (New sub-clause)

Add new Sub-Clause:

Puddle collars and anchoring flanges used as pipe anchorages shall be of the same dimensions as corresponding flanges but those cast into concrete walls shall not be drilled. The anchoring collar/flange 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 material shall not exceed its yield stress.

'Thin' puddle collars/flanges are not required to transmit thrust, their purpose being to assist with the waterproofing of the concrete chambers by increasing the path that ground water might have to take to enter the chambers. These will be shown on the drawings with a thickness dimension which is much less than the standard flange thickness for the relevant pressure class of pipe.

The minimum distance of puddle flanges from reinforcement bars is 100mm to ensure that there is no current leakage between reinforcement and puddle flanges where cathodic protection systems are installed.

PSL 3.4.6 Pipe material (New sub-clause)

Add new Sub-Clause:

Pipe supplied under this contract as free issue material, by the Employer, is listed in the project specifications.

PSL 3.4.7 Ovality of pipe (New sub-clause)

Add new Sub-Clause:

It is the Contractors responsibility to ensure that the ovality of the large diameter slender pipe remains within specified limits during construction. The maximum deflection of any of the pipe DN1000 and larger, shall not be more than 5.0% of DN, once all backfilling has been completed in accordance with this specification. For the cement mortar lined pipe, the deflection shall be limited to 2.0%

Should it be required, the Contractor shall utilise spiders of approved type and design to support the pipe during backfilling, in order to ensure that the pipe does not deform outside the specification tolerances and also ensuring that the internal lining of the pipe is not damaged.

PSL 3.8 JOINTING MATERIALS

PSL 3.8.1 AC Pipes

Replace Sub-Clause with the following:

Fibre Cement and concrete pipes

Jointing methods applied shall conform with the supplier/manufacturer's requirements

PSL3.8.2.1 Flexible couplings

Delete the Sub-Clause and substitute the following:

Where ordered, steel flexible couplings are to be of the "Viking Johnson"/"Klamflex"/ "Aqualok" or similar approved type without central registers, each comprising one center collar, two special flanges, two rubber rings and hot dipped galvanized mild steel bolts.

Steel couplings shall be assembled strictly in accordance with the manufacturer's instructions and all bolts shall be torqued to the value recommended by the manufacturer. On completion of hydraulic pressure testing of the installation, the entire joint shall be protected as described in the particular clauses for corrosion protection.

The tendered prices for laying and jointing are to include for the supply of all necessary materials, plant and labour to complete the joint.

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 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 65% of the yield point.

Mild steel couplings shall be protected by an approved epoxy coating system such as "Cupon KSIR88" (or similar approved) 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 hot dipped galvanized. The plain end of the pipe shall be properly prepared, and in the case of steel pipes before corrosion protection, so as to accept the flexible coupling.

Adaptor couplings and anchoring adaptor joints shall comply with the above specification for flexible couplings and be of a similar design, but one end shall be flanged to enable connection of plain ended pipes to flanged joints. The adaptor joints are to be complete with bolts and nuts for connecting the flanged joint to the anchoring flange situated generally 300 mm to 400 mm from the plain end of pipe. All bolts, nuts and washers are to be hot dipped galvanized. In order to anchor the plain ended pipe to the flanged joint all of the bolts for the flanged joint are to pass through the anchoring flange and are to be fitted with nuts and washers at the flanged joint and on either side of the anchoring flange.

Each coupling shall permit a repeated movement of 10mm to cater for thermal expansion and contraction of the pipe and shall allow for the following angular deflections: (unless shown differently on the drawings)

- 6° up to and including 600 mm diameter;
- 5° over 600 mm up to and including 750 mm diameter;
- 4° over 750 mm up to and including 900 mm diameter;
- 3° over 900 mm up to and including 1 200 mm diameter;
- 2° over 1200 mm diameter.

PSL 3.8.2.5 Restrained flexible couplings

Add new Sub-Clause:

Special restrained or anchoring flexible adaptor joints or flanged adaptor joints ("Viking Johnson" or similar) for connecting plain ended steel pipes to flanged joints are to be supplied complete with bolts, nuts, washers, gaskets, etc for connecting flanged joint to anchoring flange.

Anchoring or restraining flange to be welded approximately 300mm from plain end of pipe. Restraining flange adaptor to use minimum of 4 number grade 4.8 restraining bolts, equally spaced around circumference of flanges. Restraining flange to be to manufacturers specification and approved by the Employer's Agent.

PSL 3.8.3 Flanges and accessories

PSL 3.8.3.1 Bolted connections (New sub-clause)

Add new Sub Clause:

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

Flanges shall comply with the details shown on the drawings. For all pipes larger than 150mm diameter, connected to equipment or fittings, or where specifically indicated, shall be flanged to SANS 1123:2007 as amended or BS EN 1092 where SANS 1123:2007 (Table 3) does not apply.

All plate flanges for welding shall be Type 3 and blank plate flanges shall be Type 8. Blank plate flanges greater than 500NB, not covered by the above specification, shall be designed by the manufacturer. In this instance, the Contractor shall provide the Employer's Agent with the design calculations together with plate thickness and flange drilling within 28 days of Commencement of the contract.

Matched flanges shall correspond in construction and dimensions to flanges on equipment. Matched flanges shall be provided with the correct bolts, nuts and packing rings.

Temporary end covers shall be provided by the Contractor for protection of flanges, and prepared 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 mating faces of flanges that are to be in contact with gaskets shall not be painted or coated. After application of all pipe and flange coatings, there shall be no runs or drips on the mating face and, where applicable, the flange profiling shall be clearly visible. After blast cleaning the mating faces shall receive one coat of rust inhibitor (Plascon Rustrix 84 or equal approved). There shall be no coating build-up in the flange bolt holes that could snag the bolts.

The Contractor shall ensure that gaskets and bolting of the correct size and the specified materials are used.

Gaskets are to be installed centrally without damage. No grease or other compound shall be used to hold the gasket in place prior to tightening the bolts. Ring Insert gaskets shall be installed after fitting the bottom half of the bolts and nuts loosely in order to ensure that the gasket assembly is centered properly. Full Face gaskets are to be centered by inserting bolts and nuts loosely around the circumference of the flange, at an even spacing.

Unless otherwise specified, bolts shall conform to property class 4.6 of SANS1700-5-1:2003. Bolts and nuts connecting mild steel flanges to stainless steel flanges or stainless steel flanges to stainless steel flanges shall be grade 304 stainless steel. Bolts, nuts and washers used on insulated flanges shall conform to the Umgeni Water Particular Specification for Cathodic Protection.

All bolts, tie-bolts, nuts and washers shall be galvanized to SANS 121:2000 and shall comply with the relevant requirements of SANS 135 – 1985 and SANS 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.

Except in the case of insulating-flanges, all bolt threads shall be liberally coated with “Nickel Slip” or similar approved compound prior to assembly. Upon completion, bolt heads, washers and nuts shall be wrapped as described under the relevant particular specification for corrosion protection.

Insulating flanges shall comply with the requirements of Mhlathuze Water as detailed in the particular specifications where the Umgeni Water specification of steel pipe insulating flange joints has been attached.

PSL 3.8.8 Joining of pipe with plain end conditions with collar welded band (New sub-clause)

Add new sub-clause

Pipe of nominal diameter, less than DN800, supplied with plain end conditions, shall be joined with the use of a band welded onto one end of the pipe where a joint is to be formed. The band is to form a socket type end condition with the pipe to be joined in a spigot and socket manner.

The collars/ bands shall have a width of 100mm, fabricated from flat plate with an internal diameter of 0.75% larger than the outside diameter of the pipe, should this tolerance be required to be relaxed, this needs to be agreed with the Employer's Agent and approved of by the Employer's Agent.

A minimum plate thickness not less than 4.0mm greater than the wall thickness of the pipe to which it will be welded. The grade of steel identical to that of the pipes.

The fillet weld where the band is welded to the pipe shall be a full fillet weld with no undercut.

The band shall be fitted with 50% of its width overlapping with each pipe end inserted into the band socket.

Weld procedures shall be developed for the welding of the band to pipe ends and for pipe joints made with fitted bands.

All pipe cut for the manufacturing of pipe specials to in lengths to suit, shall be joined with the collar welded method where a spigot and socket system as a result of an absent bell does not exist.

PSL 3.9 CORROSION PROTECTION OF PIPELINES, FITTINGS AND PIPE SPECIALS

Delete the Sub-Clause.

All corrosion protection clauses for steel pipelines are shown in this specification as Particular Specifications for corrosion protection, attached under the particular specification section.

All metal surfaces shall be prepared and coated in order to ensure that no bare metal is exposed to ambient conditions which could lead to corrosion.

The cost of application of corrosion protection mechanisms are specified are deemed to be included in rates for laying of pipe and fitment of specials and fittings and equipment.

Protection against electrolytic corrosion shall be in terms of the UW Particular Specifications.

PSL 3.10 VALVES

From this sub-clause delete "SABS 1200 LK" and substitute the following:

PSL 3.10.1 Control valves (New sub-clause)

Add new sub-clause

The pressure reducing valve (PRV) and surge relief valve required shall be manufactured by Bermad, Bakers, Clayton and or other approved control valves suppliers, and shall comply with the following:

General:

- a. Each control valve and all other parts of the control valve assembly such as pilot valves, linkages, brackets, indicators, and all other components and everything necessary for the proper functioning of the control valve assembly shall be supplied and installed by the Contractor in accordance with the valve supplier's instructions and checked by a representative of the supplier after installation.
- b. Each control valve shall be suitable for operations under pressure class shown on the drawings

- c. Each control valve assembly shall then be commissioned and tested by the Contractor by using it to perform all of its automatic functions, as described below, in the presence of the Employer's Agent and a representative of the firm which supplied the control valve to the Contractor.
- d. After satisfactory testing and commissioning of each installation, the control valve assembly shall be demonstrated and explained to a representative of the Employer, attending on the Site for this purpose, who is to be handed five copies of the Manufacturer's drawings and operating instructions prepared by the supplier of the control valve assembly.
- e. Each control valve assembly shall operate in the system indicated on the drawings and amplified by certain data set out below.
- f. The control valve assembly shall operate automatically and smoothly without attendance under all normal operating conditions.
- g. The control valve assembly shall be manufactured generally in accordance with SANS 1808-31 for automatic control valves and all components of the entire assemblies shall be made of specially selected corrosion resistant materials capable of withstanding the corrosive atmosphere which will exist in the pipe, valve chamber and reservoir.
- h. The interior surfaces of the control valve shall be coated with an approved epoxy compound similar or equal to KSIR 88.
- i. The control valve shall be fitted with an indicator to give visual indication of the position of the main diaphragm (i.e. to indicate the degree of the opening or closing of the valve).
- j. Approved strainers that can easily be cleaned, shall be supplied and installed on all pilot piping to protect the small ports from becoming clogged with grit.
- k. After acceptance of his tender, the Contractor shall obtain for the Employer's Agent from the valve supplier, fully dimensioned drawings of the whole control valve assembly in triplicate, together with illustrations and the curves referred to above.

PSL 3.10.2 Scour valves (New sub-clause)

Add new sub-clause

Scour valves shall be Wedge gate valves and shall comply with SANS 664 and UW's Particular Specifications for Wedge Gate & Resilient Seal Gate Valves.

PSL 3.1.3 Isolating valves (New sub-clause)

Add new sub-clause

Isolating Valves specified to be of the butterfly type and shall comply with the following:

- a. Shall be flanged in accordance with the specified pressure rating.
- b. Shall be of a Wafer type \.
- c. Flange to flange dimension shall not exceed 100mm.
- d. Shall be supplied by a Manufacturer approved by Mhlathuze Water (e.g. Oreg, Amri, Gonec, JMC and AVK). Other Manufacturers to be pre-approved by MW's quality inspectorate.

PSL 3.10.4 Air valves (New sub-clause)

Add new Sub-Clause:

Air Valves shall comply with UW's Particular Specification for Air Valves and shall be installed to be anti-theft.

Air Valves supplied are to be maintained under full pipeline working pressure without the need to isolate the air valve.

PSL 3.11 MANHOLES

Add to Sub-Clause:

Galvanised steel fabricated manholes covers are to be used within fenced reservoir and pump station sites and are to be as per the standard drawing for the covers. Manholes covers for chambers along the pipeline route shall be polymer lockable manhole cover and frame, "715mm diameter medium duty polymer lockable manhole cover and frame by "Maverick Trading Type 1B" or "Smartlock Rhi-Node HD700" manhole lid and frame.

PSL 4 PLANT

PSL 4.1 HANDLING AND RIGGING

Add to Sub-Clause:

The Contractor shall supply, operate and maintain an adequate fleet of vehicles including cranes to be used for the safe conveyance of the pipes, specials and fittings. The pipes and specials shall be handled with care at all times to avoid damage to them or to the protective coatings. The equipment for the purpose of loading, transporting, unloading and moving and the manner in which they are handled shall be subject to the approval of the Employer's Agent.

During transport, the pipes and specials shall be supported on suitable pipe saddles such that all pipes and specials shall be separated so as not to bear against each other and shall be handled with care at all times to avoid damage to them or to the protective coatings. The equipment for the purpose of loading, transporting, unloading and moving and the manner in which they are handled shall be subject to the approval of the Employer's Agent.

The use of bare cables, chains, hooks or narrow skids will not be permitted and the

Contractor shall supply canvas slings and padded skids and ramps of a sufficient width to prevent damage to the protective coating. The dragging or skidding of pipes and specials in contact with the ground shall not be permitted.

When handling 12m pipe lengths or longer, the pipes shall be lifted with band slings (minimum 300 mm wide) placed centrally around pipe at two points 6 metres apart.

PSL 5 CONSTRUCTION

PSL 5.1 LAYING

PSL 5.1.1 General

Add to the Sub-Clause:

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 to the Site of the Works."

Pipe upliftment from pipe yards, transportation and stringing next to pipe trench for laying shall conform with the requirements of this specification.

During transport, the pipes and specials shall be supported on suitable pipe saddles such that all pipes and specials shall be separated so as not to bear against each other and shall be handled with care at all times to avoid damage to them or to the protective coatings. The equipment for the purpose of loading, transporting, unloading and moving and the manner in which they are handled shall be subject to the approval of the Employer's Agent.

The use of bare cables, chains, hooks or narrow skids will not be permitted and the

Contractor shall supply canvas slings and padded skids and ramps of a sufficient width to prevent damage to the protective coating. The dragging or skidding of pipes and specials in contact with the ground shall not be permitted.

Pipe shall be handled to ensure that no structural damage take place on any pipe or fitting at any stage.

PSL 5.1.2 Damage

Add the following to L 5.1.2:

All pipes, specials, valves and fittings shall be carefully examined by the Contractor for internal and external damage at the following stages:

- a) on arrival at laying site;
- b) prior to laying;
- c) after laying;
- d) prior to backfilling; and
- e) during backfilling.

All damage or defects of any kind shall be repaired by the Contractor and to the satisfaction of the Employer's Agent or an appointed third party inspection authority immediately after detection at any of the above inspections.

Where, in the opinion of the Employer's Agent, satisfactory repairs are not practicable, the damaged materials shall be replaced by the Contractor at his own cost.

PSL 5.1.3 Keeping pipelines clean

Add to Sub-Clause:

The Contractor shall ensure that all pipe work is installed internally free of any contaminants. All traces of dirty water, slag, splatter, swarf, cuttings, coupons, welding rod ends, 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.

Once the lining repair has been completed, cleaned off and inspected, that specific section of the pipe shall be blocked off to prevent any further access by workers.

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 Employer's Agent 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 Employer's Agent reserves the right to utilize cameras or any other means to inspect inaccessible areas.

PSL 5.1.3.1 Cleaning valves and fittings (New sub-clause)

Add 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 Employer's Agent.

PSL 5.1.5 Working inside pipes and protection of internal linings (New sub-clause)

Add new Sub-Clause:

All possible care shall be exercised during construction in order to avoid damage being inflicted to the pipe lining as a result of the installation and welding activities, and the following procedures shall be adopted at all times:

- Placing of rubber protection mats in the pipeline to ensure that no damage occurs as a result of foot traffic, falling tools and equipment, weld splatter and or grinding spray.
- Labourers working inside the pipe are to wear soft soled protective shoes.
- Wet sacking or rubber matting shall be placed on the pipe invert in the areas where welding or flame cutting operations are in progress to minimise the extent of damage to the lining from weld splatter or molten metal from flame cutting. This requirement shall be strictly enforced.
- Tools shall be placed on rubber foam or resilient rubber matting to protect the epoxy pipe lining against mechanical damages.
- Particular care is to be taken inside the pipe when tie-ins into the pipe is done for the purpose of fitting air valves, scour valves, by-passes and other tie-ins.
- Once internal work in a specific pipe sections has been completed and the pipe has been successfully cleaned, holiday detected and approved as being constructed to the satisfaction of the Employer's Agent, the Contractor shall block off that section of pipe to prevent any further man entry into same.
- The rates tendered in the Bill of Quantities shall include for all the measures required under this clause.

Detection of holidays in the internal epoxy lining will only commence once all internal activities in the pipeline have been completed. That is welding of joints, preparation of joints for epoxy lining reinstatement as well as epoxy lining reinstatement in terms of the requirements of this specification. This excludes repair of epoxy lining as a result of damage incurred before the pipe is transported to the construction site as these defects will be repaired in the pipe yards, according to the specifications.

Once all work is complete in a particular length of pipe, the Contractor shall arrange for the pipe to be thoroughly swept of all dust and debris. The pipe lining and joint repair will then be tested with a "wet sponge" detector set at 90 Volts in order to detect any electrical insulation defects.

Each section of the pipe work is to be internally inspected and passed by the Employer's Agent, once construction has been completed. If the pipe work is not satisfactory, the Contractor shall clean the pipe at his own expense until the pipe is passed as clean. The Employer's Agent reserves the right to utilize cameras or any other means to inspect inaccessible angles.

PSL 5.1.6 Equipment for inspecting internal surfaces of pipes (New sub-clause)

Add new sub-clauses

PSL 5.1.6.1 CCTV

Weld Inspections

Immediately after the weld has cooled it is to be visually inspected both internally and externally. Internally the welds are to be checked with a suitable CCTV camera, if it is too small for physical entry. (Assuming welding of root welds were from outside the pipeline)

The internal surface of the pipe is also to be checked for any local damage. Internal and external photographs of the joint repair and weld are to be taken from 4 different angles at approximately 90° spacing, identified with adjoining pipe numbers and recorded. Weld and internal lining approval is to be signed off by representatives of the Contractor and Employer's Agent.

The equipment shall be kept in good condition and operating order throughout the duration of the Contract. No separate payment will be made for this equipment and the costs therefore will be deemed to be included in the tendered rates.

Any defects of the weld or internal lining repair must be fixed in accordance to the specification and inspected again with a CCTV camera at the Contractor's expense

PSL 5.1.7 Pipe support (New sub-clause)

Add new Sub-Clause:

Temporary pipe supports may be used to assist setting up and assembly. However permanent pipe supports should be installed as soon as possible to minimize double handling and/or omission during construction.

Permanent pipe supports shall be constructed as indicated on the drawings or as directed on site.

Before testing, all permanent supports shall be complete and all temporary supports removed, unless otherwise agreed by the Employer's Agent.

PSL 5.1.8 End caps (New sub-clause)

Add new Sub-Clause:

The Contractor shall, at the end of each day's work, fit end caps to the open ends of the pipeline under construction. The end caps shall be manufactured in such a manner that it can be fitted to seal off the pipeline to the extent that it is totally dust and waterproof. The end cap must be able to withstand a pressure of 5m head of water externally when fitted.

End caps shall be maintained during nonworking periods.

Notwithstanding the requirement for end caps, the Contractor remains responsible for preventing pipe being laid from floating during wet conditions. The Contractor remains responsible for dealing with water.

The tendered rates for the laying of pipe shall be deemed to include for the supply, fitment, and maintenance of the end caps.

PSL 5.1.9 Marker posts (New sub-clause)

Add new sub-clause

Pre-cast concrete marker posts as shown on the drawings shall be set at all horizontal direction changes and where otherwise indicated by the Employer's Agent.

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

PSL 5.2 JOINTING METHODS

PSL 5.2.2 Flanged joints

Add to the Sub-Clause:

Before being brought together, the ends of the pipes, fittings, couplings and 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 (compressed fibre cement or other approved gaskets on flanged joints), 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 using torque wrenches to achieve the required compression force on the gasket. Diagonally opposing bolts shall be tightened sequentially.

If and where full face gaskets are used, the jointing material shall be flush with, or protrude beyond, the outer circumference of the flange (this is not applicable to raised face flanges). On completion of the joint, the flanges and bolts shall be protected as described in Clause 5 of UW's Particular Specification for the Protection of field joints of steel pipe and repairs of damaged coatings.

Flanges to fittings or joints will generally be to SANS 1123. It is possible, however, that the Employer may supply valves with flanges which have not been drilled according to these standards. The Contractor shall be responsible

for checking the flange drilling of all fittings supplied by the Employer and for supplying flanges drilled to match. No additional payment is to be made for this work and the Contractor is to allow for such in his rates.

Contractors are to allow in the rates for the supply and installation of mild steel pressed washers (two per bolt) for all flanged fittings. The washers shall have an ID of 2 mm greater than that of the bolt. Tenderers are to ensure that the length of the bolt includes allowance for the washers.

PSL 5.2.3 Welding steel pipelines DN600mm or greater

Delete the title and replace with

“Welding (Steel Pipelines)”.

Delete the 1st sentence and replace with:

Field welding of steel pipelines shall be carried out in accordance with the relevant requirements of the latest version of API 1104. The Contractor, prior to commencement of welding, shall produce a qualified welding procedure in accordance with the latest version of API 1104, for the intended sizes, processes, positions and consumables to be used on this project.

Welding shall be carried out by welders who are competent in terms of the procedure approval test given in API 1104. Prior to commencement of welding, the current qualification of each welder must be produced in accordance with the welding procedure. Should constant repairs be required on welds carried out by one particular welder, the Employer's Agent may request that the welder be re-tested or removed from the project.

Add to the Sub-clause:

Examination of Welds

The Contractor shall include in his prices for the manufacture and/or laying of pipes, bends, fittings and specials for the cost of carrying out, under the supervision of the inspector appointed by the Employer, examination of welds on the following basis:

- (a) Manufacture of Pipes (Not applicable to pipes supplied by the Employer)
 - i) FIVE percent (5%) random radiographic examination of all welds deposited by an approved automatic process.
 - ii) TEN percent (10%) random radiographic examination of all welds deposited manually or semi-automatically, and repairs to welds done by an automatic process (should repairs exceed 25% of the tests the percentage of examination shall be increased to 20%).

- (b) Field Welds

Radiographic testing will be performed on butt welds and dye penetrant testing on fillet welds. Welds will be tested and adjudicated in accordance with API 1104 and will be tested with the following frequencies:

100% of all welds executed by each Welder will be tested.

Repairs of welds will be permitted in accordance with approved repair procedures. Repairs shall be re-examined using the relevant non-destructive testing method. All costs associated with the repair of defective welds will be borne by the Contractor.

- (c) Welds in Fabricated Bends, Fittings and Specials

- i) ONE HUNDRED percent radiographic examination of all weld deposited manually or semi-automatically in bends, fittings and specials which cannot be hydraulically tested because they have a plain end.
- ii) TEN percent radiographic examination of all welds deposited manually or semi automatically in all flanged bends, fittings, and specials which are to be tested hydraulically.

The Employer's Agent shall in all cases determine which welds are to be radiographed on the quantity basis specified above. All radiographs and records thereof made by the Contractor shall be made available to the Employer's Agent to enable him to determine whether the welds are acceptable or not and no lining or wrapping of pipes shall be permitted until the welds have been accepted by the Employer's Agent. To avoid any unnecessary delays, at the option of the fabricator, radiographs may be approved by the manufacturer's inspectors subject to them being subsequently submitted to and approved by the Employer's Agent.

When a section of the weld is shown by radiography to be unacceptable, and if the limits of the deficient weld are not defined by the radiograph, additional radiography shall be carried out at the Contractor's expense until the limits of the deficiency are determined.

Repairs shall be re-examined using the relevant non-destructive testing method. All costs associated with the repair of defective welds will be borne by the Contractor. All repair welds shall be identified with a stamp marking, indicating which welder conducted the repair. Repaired welds shall be radiographed at the Contractor's expense but, after any repair welder has had ten consecutive repairs approved, the extent of the radiography of the repairs conducted by the welder may be decreased by agreement between the Employer's Agent and the Contractor.

In the event of any welded joint proving unsatisfactory when the pipeline is subjected to the radiographic, dye penetration or hydraulic tests, the Contractor shall be held responsible for all costs involved in repairing the joint or cutting it out and welding in a new section of pipe, as may be ordered by the Employer's Agent, thereafter restoring the lining and wrapping, if these have become damaged, all to the satisfaction of the Employer's Agent.

After jointing and testing, the protective lining and wrappings are to be rendered continuous in the manner specified. Holiday detection tests shall be carried out in the field to ensure continuity of lining and wrapping.

Production Testing of Welds (Not applicable to pipes supplied by the Employer)

The Contractor shall also include in his prices for the supply of pipes the cost of carrying out at the factory, non-destructive tests of shop production welds (additional to the qualification tests for welding procedure) on the following basis:

- One pipe from each one hundred pipes produced shall be selected at random and specimens for two guided cold bend tests and one transverse tensile test shall be cut therefrom and tested in accordance with SANS 719:1971, Section 7.
- In the case of the guided cold bend tests, where welding is carried from one side only, bend - specimens shall be tested with the rest of the bend in tension; where welded from both sides the specimens shall be tested with the inner and outer welds in tension alternately.
- Tensile tests shall be carried out as for the qualification tests.
- The pipes from which successfully tested specimens have been taken shall be trimmed to the maximum possible length and shall be accepted by the Employer for payment purposes as full standard pipe lengths.
- In the event of the welds of any pipe failing to reach the standard of acceptance, such pipe shall be rejected. Two further plate coupons shall be prepared from different pipes, selected at random by the Employer's Agent, for each specimen that has failed to reach the required standard. In the event of such additional tests proving to be satisfactory repairs to the pipe originally failing any test will be permitted by the Employer's Agent and such repairs and subsequent re-test shall be at the Contractor's expense. In the event of the additional tests also failing to reach the required standard the Employer's Agent shall have the right to reject the entire batch of pipes from which the coupon plates were cut.

The cost of weld tests are deemed to be included in the rates for pipe laying.

PSL 5.2.3.1 Weather conditions (New sub-clause)

Add new Sub-Clause:

Welding shall not be performed under conditions that could affect the quality of the welded joint (e.g. high moisture or windy conditions). Windshields may be used where practical.

PSL 5.2.3.2 Clearance (New sub-clause)

Add new Sub-Clause:

The minimum clearance around the pipe during welding shall be 500mm or such other minimum distance that may be required to facilitate compliance with the approved welding procedure. When welding in the trench, adequately sized "fox holes" shall be excavated / formed so as to provide adequate access for the welders.

Excavation for fox holes shall be deemed to be included in the rates for pipe trench excavation.

PSL 5.2.3.3 Visual inspection (New sub-clause)

Add new Sub-Clause:

100% of each joint will be examined and the following criteria shall be met:

All welds shall be substantially uniform in appearance with the inner and outer weld beads not exceeding 3 mm in height unless otherwise required in terms of the approved welding procedure.

The weld, heat affected zone, and surrounding parent metal shall be free from cracks, porosity and trapped slag.

All weld splatter must be removed prior to corrosion protection application.

PSL 5.2.3.4 Quality control (New sub-clause)

Add new Sub-Clause:

Records of which welds were carried out by each individual welder as well as non-destructive testing results shall be submitted to the Employer's Agent monthly. Should there be repetitive or serious defects, this information shall be forwarded to the Employer's Agent immediately.

PSL 5.2.3.4.1 Visual Inspection

100% of each joint will be examined and the following criteria met:

All welds shall be substantially uniform in appearance with the inner and outer weld beads not exceeding 1 mm and 3 mm respectively in height above the pipe surface.

The weld, heat affected zone and surrounding parent metal shall be free from cracks, porosity and trapped slag.

All weld splatter must be removed prior to the application of corrosion protection.

PSL 5.2.3.4.2 Preparation of Joint

Where scarf cutting of the pipe ends is required in the field the pipe ends shall be prepared by machining or machine flame cutting. Hand flame cutting shall not be permitted except under the circumstances listed below as sub paragraphs.

PSL 5.2.3.4.3 Field Welding

Steel pipes may be cut by hand flame as follows:

- A. In the case of cement lined steel pipe, the cement lining shall be chipped back 50 mm after the initial cut and the pipe then re-cut ± 10 mm from the original cut in order to remove any "blow-back".
- B. In the case of epoxy lined steel pipe, all damaged lining shall be removed and reinstated in compliance with the Clause PSL 3.9 or relevant particular specification.
- C. All flame cuts shall be made good by grinding to form the correct gap between steel sections prior to welding.
- D. Bevels may be cut by flame provided they are made good by grinding.

When jointing pieces by butt-welding the number of tack welds applied shall be kept to a minimum to be effective in holding the pipe ends securely and to maintain the required root gap prior to welding, but shall in any case be not less than four.

NOTE: Should the Contractor want to utilize shorter lengths of pipe than those supplied, for construction purposes, in order to work in confined areas, a detailed method statement in motivation for such cutting, shall be submitted to the Employer's Agent for approval. Pipes shall not be cut into shorter lengths for construction purposes, unless approved by the Employer's Agent. The costs associated with any additional welds at joints, as a result of cutting pipes into shorter lengths as approved by the Employer's Agent, shall be borne by the Contractor.

PSL 5.2.3.4.4 Welded Attachments

Where it is necessary to weld attachments to pipe work (e.g. Cathodic Protection Lugs and Pipe Support Brackets and Trunnions) the material of the attachment is to be compatible with the pipe work and be welded on by an approved welder using approved welding procedures.

Welded attachments onto pipe work are to be subjected to the same level of NDT as the pipe work.

PSL 5.2.3.4.5 Aligning

The alignment of abutting ends will be such that the offset does not exceed 1.5 mm. Line up clamps may be used for joint "fit-ups."

"Dogs" and wedges for the alignment of pipe work for butt when fitting up before welding, shall not be allowed as a rule. Should the Contractor require to use "dogs" and wedges, approval from the Employer's Agent shall be obtained. The Contractor shall, upon removal of any "dogs" and wedges pay attention to the following repair requirements:

- Where “dogs” and wedges have been removed from the pipe, the damage to the metal surface of the pipe shall be ground clean.
- The required number of welding runs shall be performed in order to fill the hole with welded material.
- The filled area shall be ground smooth in order to ensure that the repaired area is level with the original pipe material.
- A dye penetrant test or whichever is most applicable, shall be executed on the repaired area before repairing the external coating.
- The repair to the outer coating shall be effected in terms of the accepted procedure for coating repair.
- The repair to the inner lining at the point of removal of “dogs” and wedges shall be effected in terms of the accepted procedure for lining repair.

PSL 5.2.3.4.6 Manufacturing of Crotch, Saddle Plates, Wrappers and Gussets

The Contractor shall pay careful attention to the detail when crotch and saddle plates, and/or gussets and wrappers are manufactured. All plate material for any one of these items shall, where it has to be welded together or welded onto pipe specials, be bevelled to the extent that full penetration welds would be possible under all circumstances. The Employer's Agent is to be requested to inspect all applicable fit ups for approval, before welding commences. (This is required for workshop fit ups as well as field fit ups). 100% NDT testing or other applicable test methods will be required on all welds to crotch and saddle plates, gussets and wrappers. The tendered rates for the manufacturing of pipe specials which require crotch plates, saddle plates, gussets or wrappers, shall be deemed to include for all the material to be supplied, the welding and NDT testing as required by this specification.

The saddle plates and wrappers shall be manufactured from the same grade of donor pipe and the same diameter as the pipe on which the saddles or wrappers are to be fitted. Coating on the pipe, onto which saddles or wrappers are to be fitted, shall be removed and saddles or wrappers shall be cut from the donor pipe material to the required dimensions. The donor pipe material shall be slightly heated and then hammered into shape onto the accepting pipe in order to take up the required diameter.

All saddle plates are to be manufactured from free issue pipe material of same DN and grade as the main pipe, in terms of the drawings for the specific pipe special.

All crotch plates are to be manufactured from material procured by the Contractor, in terms of the drawings for the specific pipe special.

PSL 5.2.5 Cut pipes (New sub-clause)

Add new Sub-clause:

Cut pipes shall be used where required as closure lengths. The cut ends shall be prepared in accordance with clause 5.1.5 of SANS 719:2008. The finished dimensions of ends cut on 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.

PSL 5.3 SETTING OF VALVES, SPECIALS AND FITTINGS

Add the following:

Valves and fittings shall be installed in accordance with the manufacturer's instructions. Where valves are supplied by the Employer at Municipal depots they shall be collected by the Contractor at such depots and transported to the laying site.

Valves are to be set correctly in the positions indicated and supported on concrete stools, except where not so required by the Employer's Agent and shall be installed with their operating spindles vertical. 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. The Contractor shall supply the insertions and bolts necessary for the installation of the valves.

PSL 5.3.1 The storage, commissioning and installation of butterfly valves

Add new Sub-Clause:

Butterfly valves shall be stored, installed and commissioned so that the valve blade seal is protected at all times from oxidation, ozone attack and the ingress of dirt. All butterfly valves are to be installed such that the disc is installed horizontal to the flow direction with the hand wheel on the righthand side of the flow direction.

PSL 5.3.1.1 Storage

Add new Sub-Clause:

- The valve is to be stored in the vertical position.
- The valve should be stored in the cracked position (i.e. not shut).
- The valve should not be stored in the vicinity of electrical equipment.
- The valve should be stored under cover and protected from temperature extremes.

PSL 5.3.1.2 Installation and commissioning

Add new Sub-Clause:

- Prior to the installation of the valve, all dust and dirt should be washed off the valve, particularly the seal, seat and any tapped holes in the valve body.
- The seals of all valves shall be checked for complete closure when the valve blade is in the fully closed position. (See seal adjustment below).
- The valve must not be lifted by the hand lever, valve actuator or the handwheel.
- The valve must not be used for lining up the pipework.
- The valve should be left in the fully open position after installation and prior to commissioning of the system.
- The valve is to be installed such that the disc opens in the direction of flow and is horizontal to flow.
- The valve is to be installed such that the hand wheel is on the right-hand side of the pipeline in the direction of flow.

PSL 5.3.1.3 Seal adjustment

Add new Sub-Clause:

To adjust the seal, a 0,004" feeler gauge and an Allen key are required.

With the valve in the fully closed position, it should be possible only with difficulty to introduce the feeler gauge between the valve blade seal and the seat.

If, due to seal movement during storage the feeler gauge can easily pass between the seal and seat, then the clamp ring socket head cap screws in the vicinity of the gap should be finger tightened with the Allen key so as to push the seal out and close the gap.

PSL 5.3.1.4 Payment

All costs incurred for the seal adjustment as stipulated above shall be included in the respective rates for installation of the valves.

PSL 5.5 ANCHOR/THRUST BLOCKS AND PEDESTALS

Add to the Sub-Clause:

For continuously welded or flanged steel pipeline anchor/thrust blocks are not required except where specifically shown on the drawings and scheduled in the Bill of Quantities.

PSL 7 TESTING PSL 7.1 GENERAL

Add to the Sub-Clause:

Inspection

Facilities shall be provided to the Employer's Agent so that he may be able to inspect, during the process of welding, any layer of weld metal. He may require any defective welds either to be cut out and re-welded or repaired at his discretion. The Contractor shall clean thoroughly all welds prior to inspection. The Employer's Agent may require a number of completed joints, selected at random, to be cut for mechanical tests or to be selected for visual inspection, micro examination or examination by other means. When the Employer's Agent orders the Contractor in writing to cut out and test joints the Contractor shall be paid for such work at day work rates.

If as a result of inspection and testing, the work of any welder is found to be unsatisfactory, the welder shall not be permitted to continue welding under this contract.

Standards of Acceptability

The completed welds shall comply with the requirements of Clause 6.0 of API 1104. Work on which unauthorised repairs have been carried out may be rejected.

Repairs to Minor Faults

Faulty welds shall be rectified in accordance with clause 7.0 of API 1104.

All costs relative to the repair of faulty joints, including removal and replacement of the backfill and making good the wrapping and lining shall be borne by the Contractor.

PSL 7.2 INITIAL TESTS ON WELDED STEEL PIPES

PSL 7.2.1 Dye Penetrant Test

Add to Sub-Clause:

100% of all fillet welds and other welds shall be dye penetrant tested. Any reduction in the percentage of welds to be tested shall be at the sole discretion of the Employer's Agent

PSL 7.2.2 Radiographic Examination

Add to Sub-Clause:

100% of all butt welds shall be radiographically tested. Any reduction in the percentage of welds to be tested shall be at the sole discretion of the Employer's Agent.

PSL 7.2.2.1 Radiography personnel

Radiography and handling of associated equipment shall only be carried out by qualified and approved Radiographers.

The Radiographers shall be in attendance and patrol the perimeter of the Radiographic Area at all times during "bombing".

PSL 7.2.2.2 Marking of radiographic area

Areas where Radiography is going to take place shall be clearly marked off with recognized tape and warning signs. Generally, this shall be a strip of about 6m wide on each side of the trench and 15m radius elsewhere. The location of the source shall be clearly marked by a red flashing light and the boundary marked by yellow flashing lights.

No person except approved Radiographers shall be allowed to enter the marked off area during radiography exposure.

The Contractor shall ensure that there is easy access for Radiography personnel to minimise their exposure to radiation.

PSL 7.2.2.3 Warning of commencement of radiography

When radiography exposure is about to commence, adequate warning to persons in the vicinity will be given by flashing lights and audible signals, whereupon all persons within the marked area shall immediately move to a safe position outside the marked area.

Before commencing radiography, the Radiographer shall carry out a thorough inspection to ensure that all personnel have left the area.

PSL 7.2.2.4 Completion of radiography

Completion of radiography shall be indicated by the switching off of all flashing lights and an audible signal.

Warning tape and warning signs shall be removed immediately upon completion of radiography in order to allow general work to proceed as planned.

PSL 7.2.2.5 Storage of radioactive sources

Radioactive sources may only be brought onto site with the approval of the Employer's Agent. The Radiographers must demonstrate that they have a recognized, safe and secure method of storing such sources.

PSL 7.3 STANDARD HYDRAULIC PIPE TEST

The Contractor shall be required to submit to the Employer's Agent a proposed methodology of how he intends to undertake the pressure testing of this pipeline, with attention given as to how the water used for the hydraulic

testing of one section can be reused for filling and testing of a following section. The position of the required metered filling points also needs to be agreed with the Authority responsible for the water supply systems of the region.

All flanged bends, fittings and specials shall be hydraulically tested at the fabricator's premises to the same pressure that they will be subjected to during the hydraulic testing of the completed pipeline. No visible signs of leakage will be permitted.

PSL 7.3.1 Test Pressure and Time Of Test

Amend sub clause as follows:

From the 4th line of sub-clause 7.3.1.1 delete the words "isolating valves and/or". Pressure testing shall not take place against closed isolating valves. Where necessary a blank flange or "spade" shall be inserted if isolation for pressure testing purposes is required at the location of an isolating valve.

Add to the Sub-clause

The field test pressure shall be as per the below table:

Reference Section	Filling Rate (l/s)	Test Head (kPA)	Time of Saturation	Time of Pressure Test
DN1500 Steel Rising Main	100 l/s*	1000	24 hours	24 hours

* Maximum filling rate, this can be adjusted subject to approval from the Employers Agent.

Each portion of the pipeline shall be subjected to a field test pressure equivalent to the head of water above mean sea level as shown on the drawings and tabulated above and the pipeline sections may be tested will be at the discretion of the Contractor provided that:

- Each section lies within a single test-pressure portion as described above and below in Clause PSL 7.3.1.6 and PSL 7.3.1.7.
- The first 600 m of pipe laid and welded must successfully pass all tests and full documentation submitted before backfilling of the subsequent section may proceed.
- Pressure testing must be carried out with backfill over the pipe barrel except at the joints which must be visible joints. Testing of welds must be strictly controlled and test results verified according to MW's specifications by an accredited independent party.
- The pipeline shall not be tested in sections exceeding a maximum allowable length of 600 m for the DN1500 pipeline unless otherwise agreed by the Employer's Agent and taking cognisance of any restriction on the length of open trench allowed. The Contractor shall make due allowance in the construction programme and in the tendered rates for the entire testing operation including for the provision of temporary end stops (flanges or bullnoses) and any other costs associated with testing the pipeline in intermediate sections.

PSL 7.3.1.2

Delete sub clauses 7.3.1.2

PSL 7.3.1.3

Delete sub clauses 7.3.1.3

PSL 7.3.1.6 Field Testing of Steel Pipelines

Add new Sub-Clause:

The required test pressure for all STEEL pipelines shall be equivalent to the head of water above mean sea level as shown on the drawings and/or tabulated in PSL 7.3.1 measured at the lowest point of the pipeline(s).

- The pressure tests on the pipeline shall not be carried out against closed valves unless otherwise agreed with the Employer's Agent. All terminal ends on the pipeline sections being tested shall be capped with blank flanges, bull nose ends or "spade" pieces as instructed by the Employer's Agent. Bull noses against which pressure testing is done, shall be welded onto the pipeline with full penetration welds as per the same specification as for a butt welded joint for the specific diameter.
- Shorter sections of pipeline may be tested at the discretion of the Contractor. Should the Contractor opt to test the pipeline in shorter sections, he shall so state in his tender and make due allowance for the additional time required in the construction programme and in the rates for temporary capping or flanging and any other ancillary costs incurred. The pipe shall not be tested until the associated structural concrete has cured for 28 days or until such concrete has attained the specified design strength.
- In the case of cement mortar lined pipelines, once filled, the pipe shall be left for 24 hours to permit maximum saturation of the cement mortar lining.
- The section of pipeline to be tested shall be pressurised to the "TEST PRESSURE" given above and left for 24 hours, during which period, the pressure drop (if any) shall be monitored with the permissible leakage for pipe = 0 litre/m.
- Should there be a pressure drop after two hours, the pipe shall be re-pressurised to the "TEST PRESSURE" and the make-up water volume carefully noted.
- The make-up volume (if any) shall be compared to the volume of water collected at visible leaking points. Should the make-up volume not be equal to the volume collected at the visible leaking points, the pipe section will have failed the hydraulic test. Should there be a pressure drop with no visible leaks, or should a significant increasing trend in make-up water be apparent, the pipe section will have failed the hydraulic test.
- The logistics and strategy for filling and hydraulically testing the pipeline need to be planned in detail and agreed with the Employer's Agent at the early stages of this contract. Arrangements need to be agreed with the Employer for making available metered water supply points for filling the sections of the pipeline that need to be tested.
- The Contractor shall be required to submit for the approval of the Employer's Agent, a detailed plan of the logistics for transferring the water from a section of the pipeline that has been successfully hydraulically tested, into the next section, so as to minimise the amount of water that might otherwise have to be discharged to waste.
- Commissioning of any Section of the pipeline shall only proceed after the pipeline hydraulic testing is successfully completed.

- Bull-nose ends may be fabricated from off-cuts of pipe supplied for the relevant section of the pipeline to be tested and will become the property of the Employer once the tests are successfully completed.
- The rate for pressure testing is deemed to be inclusive of fabrication and installation of bull-noses, scouring, supplying and install blank flanges, spade pieces etc for the hydraulic test and for removing these items on completion of the successful tests.
- On successful completion of the pressure test as per above, the Contractor is to remove all temporary blank flanges, spade pieces, etc. and pressurise the line to maximum working pressure against closed valves. Should any valve not be drop tight at this pressure the Contractor is to advise the Employer's Agent in writing of all defects encountered. The duration of this test shall be 2 hours. The rate for the testing against closed valves is deemed to be inclusive of the pressure testing rate.
- **All tests shall be carried out in the presence of the Employer's Agent at such times and in such manner as he may direct.**
- Provision shall therefore be made by the Contractor for the supply of all necessary bull-noses and blank flanges.
- 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

Add to the end of the sub-clause

The permissible leakage for

- a) Steel pipelines and fittings = 0 litre/m.

PSL 7.3.4 Water for Hydraulic Test and Disinfection (New Sub-Clause)

Add new Sub-clause:

Water used for one filling of the pipeline for hydraulic testing, one filling for disinfection and one filling after draining the disinfection water, should disinfection be required, will be provided by the Employer to the Contractor, free of charge. Additional water supplied by the Employer owing to unsuccessful disinfection and/or hydraulic testing will be charged to the Contractor at the current Mhlathuze Water bulk sales meter rate.

The tendered rates for the construction of the pipeline and the testing thereof are deemed to include for the cost of water for construction purposes and fillings, subsequent to the first fill.

Filling of the pipeline for hydraulic testing shall be carried out under the supervision of the Employer's Agent.

Filling of the pipeline for hydraulic testing shall be carried out in accordance with clause 7.3.1

PSL 7.3.5 Disinfection of The Pipeline (New Sub-Clause)

Add new Sub-Clause:

Disinfection shall be carried out under the supervision of the Employer's Agent and the Employer and shall comply with Mhlathuze Water Code of Practice for Disinfection of Potable Water Facilities.

PSL 7.3.6 Initial Filling of Pipeline (New Sub-Clause)

The entire process for filling the pipeline at any time during testing and/or disinfection shall be carried out under the supervision of the Employer's Agent and may also be monitored by the Employer. Under no circumstances will the Contractor be allowed to carry out filling of the pipeline without the supervision of the Employer's Agent, neither shall he/she permit any other persons to carry out such filling without the written permission of the Employer's Agent.

Any damage to the pipeline caused by non-compliance with this clause shall be rectified at the Contractor's expense.

Filling shall commence at the lowest end.

Maximum filling rates might be limited by existing pressure conditions of the system at the connection point. These conditions need to be pre-determined and filling rates available need to be built into the programme for construction of the Works. No claims for delay as a result of low supply pressure will be entertained.

The Contractor shall, at his own cost, provide a suitable means of conveying water from this connection to the mains to be tested, as well as a connection on the new pipeline in order that it may be filled. This connection shall be capped or removed to the satisfaction of the Employer's Agent upon completion of the hydraulic test. Payment of this shall be allowed for under the rates for the hydraulic testing of the pipeline.

PSL 7.3.6 Connections after testing (New sub-clause)

Add 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 Employer's Agent. For this reason, testing must be carried out against a blank flange, spade piece or bullnose end cap at these locations.

PSL 7.3.7 Remedial measures (New sub-clause)

Add 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 7.3.8 Draining of the pipeline (New sub-clause)

Add new Sub-clause:

The pipeline may have to be drained to carry out remedial measures. 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 Employer's Agent.

All water to be drained after disinfecting the pipeline shall be discharged in a temporary portable holding tank to dilute the chlorinated water, if required. The tendered rates for pipeline testing and disinfecting is deemed inclusive of dichlorination agents and holding tank.

For pipelines of diameters where it is practically not possible to gain human access for inspection of the internal cleanliness of the pipeline, the Contractor shall ensure that any open ends are firmly closed

PSL 7.5 COMMISSIONING (NEW SUB-CLAUSE)

Add new Sub-clause:

The pipeline will be considered to have been commissioned and practically complete once all the associated structures are sufficiently complete to carry out their structural, hydraulic and mechanical function and the hydraulic test and disinfection of the entire pipeline has been successfully completed.

Refer to the drawings for details.

PSL 8 MEASUREMENT AND PAYMENT

PSL 8.2.1 Supply, lay and bed pipes, fittings, specials and couplings

Add to Sub-Clause:

The rates tendered shall cover the cost for supplying, manufacturing, off-loading, handling, installing, laying, bedding, supporting, non-destructive testing, jointing, cutting, welding of joints and all internal lining and external coatings, coating and lining repairs and field wrapping to specifications and all connectors, bolts, nuts, washers, gaskets etc.

The Contractor shall include in his rates for every eventuality, covering steep grades, restricted access, confined spaces, high traffic volumes, working in road reserves, or whichever condition might present itself during construction.

PSL 8.2.1.1 Lay and Bed Pipeline (New Sub-Clause)

Add new sub-clause:

The rates tendered shall cover the cost of upliftment and transportation of pipe to the work front from pipe storage yards, off-loading and checking of the pipe for defects before placing, forming joint ("fox") holes in all excavated materials, setting out, installation, handling, cutting to closures and preparing ends for welding of joints, laying true to line and level on prepared trench bed and bedding.

Where joints of lengths of pipe (excluding joints to pipe specials) are concerned, separate payment items have been created for.

A maximum payment of 85 % of the tendered rate may be made for the completed section of pipeline which has not yet been successfully 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.

Notwithstanding the above, the rate for "lay and bed pipes" excludes the cost associated with the field pressure testing and disinfection of the pipeline. Separate items have been included in the Bill of Quantities for the cost associated with pressure testing and disinfection of the pipeline.

The Contractor shall include in his rates for every eventuality, covering steep grades, restricted access, confined spaces, high traffic volumes, working in road reserves, or whichever condition might present itself during construction.

The Contractor shall take note of the terrain and environment in which the pipe is to be laid and shall include in his rate for every eventuality, covering the steep grades, restricted access, confined spaces, high traffic volumes, accommodating traffic and pedestrians, providing access for road users to properties, working in road reserves of various widths, working in working corridors of restricted width, working in the vicinity of existing services; overhead powerlines; pylon bases and the existing water trunk mains, working in areas where pipe laying could be restricted to one length at a time.

The Contractor shall include in his rate for the provision of special mechanisms and equipment for all eventualities, should it be required, working in areas of restricted access where the transportation of the pipe, the excavation and removal of spoil, the importation of bedding material, the laying of the pipe and all other associated activities that are impeded as a result of difficult access, and all other aspects that require consideration in order to lay and bed the pipe.

The Contractor shall ensure that residents have access to their properties and that access to relevant road users is maintained at all times, that traffic control is exercised as per the relevant specification and that the appropriate construction technique is utilized for the specific site constrictions.

The Contractor shall familiarize himself with the pipeline route and the terrain over which the pipeline is to be constructed and the tendered rates under this item shall be deemed to include for all eventualities to lay and bed the pipe. No Extra Over for the laying and bedding of pipe in areas of restricted access will be considered.

Unit: m

PSL 8.2.1.3 Extra over for laying of pipe through jacked sleeves (New sub-clause)

Add new sub-clause:

The Contractor shall include in his rates for the manufacturing and fitment of skids to the pipe as per the details on the drawing, the excavation of adequate feeder access pits for the pipe to be laid, the careful feeding of pipe into and through the jacked sleeve, any cutting, welding and joint repair that is required to feed the pipe into and through the jacked sleeve.

Unit: m

PSL 8.2.2 Extra Over 8.2.1 For The Supplying, Laying And Bedding Of In Line Specials

Add to Sub-Clause:

The rates shall cover the cost of supplying pipes and for fabricating and radiographic and/or hydraulic testing of bends, fittings specials, and supplying and installing flanges, couplings, valves and other appurtenances as scheduled, making good the coatings and linings, handling, inspecting, marking bends, fittings and specials with item numbers, transporting, holiday detection testing for coatings of steel pipes, forming joint ("fox") holes in all materials, off-loading, installing, 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.) and field wrapping to specifications where required for:

- a) In-Line Tees
- b) In-Line Reducers

- c) In-Line Elbows and Bends
- d) In-Line Flanges
- e) Bull Noses
- f) Segmented Bends
- g) Slip on flanges
- h) Other In-Line Specials such as spacers, spool pieces, stubs for air valves etc. as specified.

The rate will also be inclusive of gaskets, fasteners, washers, bolts, nuts, painting and field wrapping of joints.

All fabricated pipe specials to be marked with item numbers which correspond to test certificates. All items to be supplied with quality control documentation. Shop drawings of bends, fittings and specials shall be submitted to the Employer's Agent for approval prior to manufacture.

The tendered rate for the manufacture and supply of segmented bends, compound or simple, shall include for cutting, bevelling, welding, welding of collars/ bands, welding of flanges if require, NDT testing, radiographic and/or hydraulic testing of bends, surface preparation, lining and coating repair, laying and bedding, holiday detection tests as well as welding into position where required, the NDT testing of the into position welds, surface preparation of same as well as the corrosion protection of these welds.

PSL 8.2.3 Extra over clause 8.2.1 for supplying, fixing and bedding of valves

Add to the end of the sub-clause:

The prices tendered for supplying the pressure sustaining/pressure reducing valve and level control/flow control/pressure reducing valve assemblies shall cover all expenditure and everything necessary to be done by the manufacturer and supplier in order to comply with the requirements of the specifications, including attendance on site by a representative of the supplier for checking, commissioning, testing and demonstrating all in accordance with the specification and upholding insofar as supply of replacements for defective parts is concerned, all in accordance with the terms of the Contract.

PSL 8.2.5 Supply and Installation of Other Specials

Add the following to L 8.2.5:

Valves shall be supplied against the required specification.

The rate shall cover the cost of fabrication, supply, installation, uplifting and transportation, off-loading, testing of all valves, cutting and welding, gaskets, jointing (e.g. nuts, bolts, washers etc), fasteners, NDT inspections, corrosion protective wrappings etc. and for internal and external coating and lining to project specifications.

The rate for the blank flanges must be inclusive of the specified gaskets, fasteners, washers, lining and painting. The rates for any test flanges must be inclusive of the blank flange, flanged connection, isolation valve, gasket and bolts, nuts and washers required to assemble test flanges and to attach test flanges to a flange.

PSL 8.2.15 Special wrapping in corrosive soil

Delete the heading and substitute:

Corrosion Protection

Delete the Sub-Clause and substitute the following:

The costs of making good the internal linings and external coatings on all butt welded and fillet welded joints on the pipeline are to be included in the tendered rates.

Add new items:

External corrosion protection to flanges, adaptor joints, valves Unit: No

Separate items will be scheduled for each item by pipe nominal diameter.

In the case of valves, 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.

PSL 8.2.17 Cutting into and connection to existing pipeline (New sub-clause)

Add new Sub-Clause

Cutting into and connecting to existing pipeline Unit: Sum

The rate for cutting into and connecting to existing pipelines shall cover the cost of exposing the existing pipeline, making arrangements with the owner's staff to temporarily shut off the existing pipeline whilst effecting the connection, cleaning and preparing the pipe for cutting, cutting, dealing with all water (including that from possible leaking valves), preparing the pipe ends for jointing, welding / jointing and connecting the new pipework, making good internal linings and external coatings, re-commissioning the pipeline, and including all temporary supports, bedding and backfilling.

PSL 8.2.18 Pipeline Marker Posts

Add new Sub-Clause:

The rate shall cover the cost of supplying pipe markers, transporting to site, handling, excavation and installation, of concrete surround, backfilling and painting as detailed on the relevant drawings.

Unit: No

PSL 8.2.21 Hydraulic Testing (New Sub-Clause)

Add new Sub-Clause:

The rates shall cover all the cost of all the required materials, equipment, connections, personnel and procedures for filling, testing, disinfecting and draining of the pipeline where required, or sections of the pipeline during hydrostatic testing. The rates shall cover the cost of the water required for hydrostatic testing.

PSL 8.2.22 Preparation And Welding Of Beveled Ended Joints In Pipeline (New Sub-Clause)

Add new Sub-Clause:

The Contractor shall include in his rate for welding of straight joints (butt welding for plain ended pipes) in pipelines, the supply of materials, labour, plant, equipment and supervision required at each joint.

The Contractor shall include in his rate for welding of straight joints in pipeline, the supply of all materials, labour, plant, equipment, supervision, NDT testing including CCTV as required per Clause PSL 5.1.6.1, external tape wrap and internal lining repair in terms of the specification and QA/QC for on-site external tape wrap and internal lining repair in terms of the specification, required at each joint.

Unit: No

PSL 8.2.23 Preparation and Welding Of Single Mitred Joint In Pipeline

Add new Sub-Clause:

The Contractor shall include in his rate for preparation of single mitres in order to effect a mitred joint in terms of the construction drawings, the welding of the single mitred joint in pipeline, the supply of materials, labour, plant, equipment, NDT testing including CCTV as required per Clause PSL 5.1.6.1, external tape wrap and internal lining repair in terms of the specification and QA/QC for on site external tape wrap and internal lining repair in terms of the specification and supervision required at each joint.

Bell ended joints with directional change shall be tendered for under this item

Preparation and welding of single mitred joints in pipeline, refer to PSL 3.4.4.2.

Deflections 0 to 5 degrees to be included in the Contractors laying rate.

Unit: No.

PSL 8.2.24 Preparation and Welding Collar Welded Joints In Pipeline

Add new Sub-Clause:

The Contractor shall include in his rate for welding of collar welded joints in pipelines, the supply of all materials, labour, plant, equipment, NDT testing including CCTV as required per Clause PSL 5.1.6.1, external tape wrap and internal lining repair in terms of the specification and QA/QC for on-site external tape wrap and internal lining repair in terms of the specification and supervision required at each joint.

The tendered rate shall include for both fillet welds, one on each side of the collar. A collar welded joint shall be counted as one joint and not two as a result of the 2 fillet welds required to complete the joint.

The collars/ bands shall have a minimum width of 100mm, fabricated from flat plate with an internal diameter of 0.75% larger than the outside diameter of the pipe, and a minimum plate thickness not less than 4.0mm greater than the wall thickness of the pipe to which it will be welded. The grade of steel identical to that of the pipes

Welding of collar welded joints in pipeline (Diameter Nominal specified) (Provisional Quantity)

Unit: No

PSL 8.2.25 Preparation by Means Of Cutting

The rates tendered shall cover the cost of supply and installation of all materials, equipment, procedures and personnel to carry out cutting of steel pipe where directed by the Employer's Agent, for the installation of same, under conditions where dense services requires the laying of pipe in shorter than standard lengths. the rate for cutting shall include for internal lining and coating repair (Provisional quantity).

Unit: No

PSL 8.2.26 Cathodic Protection

This work is to be done by a Nominated Sub-Contractor. The Civil Contractor is to liaise & cooperate with the CP specialist to ensure that the activities of the specialist proceed in the best possible manner.

Precise details of the location of elements of the Cathodic Protection System will be confirmed by the Employer's Agent's Instructions on site, but the following points are noted:

- a) Continuity bonding is required around all in-line valves.
- b) Monitoring test points are to be installed in the line valve chambers, where shown.

Insulating flanges are required at all inlet and outlet pipe positions.

Unit: No

PSL 8.2.19 Cleaning of Internal Surfaces of Pipeline Where Instructed by The Employer's Agent

Add new Sub-Clause:

The tendered rates shall include for the equipment to pressurize the water used as cleaning medium to a minimum of 130Bar, all water, labour, transport and equipment required for cleaning the internal surface of pipe as and where required by the Employer's Agent.

The quantities stated are provisional.

Unit: m²

DRAFT DO NOT USE

PSLB BEDDING (PIPES) (SABS 1200 LB – 1983)

PSLB 2.3 DEFINITIONS

Main fill:

Delete "150 mm" in second line and substitute "300 mm".

PSLB 3 MATERIALS

PSLB 3.1 SELECTED GRANULAR MATERIAL

Delete the Sub-Clause and add the following:

All steel pipes and fittings laid under this Contract must be treated as being flexible pipes.

All the material to be used for the bedding material (that is for the cradle and the blanket material) surrounding the pipe, shall fall within the following requirements.

GRADING ANALYSIS RANGE to sterilize the reservoir	
SIEVE SIZE (mm)	PERCENTAGE PASSING
9,5	100
6,7	90 to 100
4,75	80 to 90
2,36	65 to 80
1,18	50 to 65
0,60	35 to 50
0,425	25 to 35
0,30	15 to 25
0,15	5 to 15
0,075	0 to 5

The material shall be free of organic matter and shall have a compactibility factor of not more than 0.4. The material should be classified as silty to fine sand having a stiffness ratio of not less than 5,0 MPa. Furthermore, the origin of the materials should, preferably, be river transported since it is preferable that the larger grains (3,0 to 6,7 mm in size) be rounded and not sharp and angular.

The Contractor shall be required to supply samples of the sand to be used as bedding material, to the Employer's Agent for approval, 5 days before use. Only after the Contractor has received written approval from the Employer's Agent, may he proceed with placing sand as selected granular material.

The Contractor shall carry out his own quality control testing of the granular bedding materials to ensure that it meets the specification.

PSLB 3.2 SELECTED FILL MATERIAL

Delete and replace with:

Imported selected fill material shall have a PI not exceeding 6 and shall be free of vegetation, lumps and angular stones. Maximum particle size shall be 19mm with at least 60% passing the 6.75mm sieve.

The material shall be granular and non-flaky and shall contain no organic matter. It shall have a PH greater than 5.5 and shall not cake or form lumps when drying out. The material obtained from the trench excavations might generally be suitable for use as selected fill material which is placed above the Selected Granular Material bedding to the pipe.

Several conditions for the placement of the selected fill material have been identified and will require separate treatment in the field as and when these arise:

Pipeline to be constructed beneath existing road. In this case the selected fill material shall be taken to the underside of the proposed new layer works construction where the new road will match the existing road layers or will be constructed to a new design specification. In this case the selected fill material will be placed from the top of the pipe bedding to the bottom of road subgrade level and compacted to minimum 97% Mod AASHTO density. Thereafter the structural road layers will be constructed. This procedure is necessary to limit settlement beneath roads.

Pipeline to be constructed in open field, pipeline/road reserves or rural areas under no traffic conditions. In this case the settlement of the trench outline is not a critical issue and construction of the pipe will proceed with normal **backfill material (PSDB 3.5)** placed over the selected granular bedding material as specified elsewhere in this document. The normal backfill over the selected granular material will be taken to the top of the trench at ground surface where it will be built proud by up to 100 mm of the surrounding ground surface. Placement of the normal backfill material to ground surface level will be carried out in layers maximum 300mm loose thickness. Compaction will be minimum 95% Mod AASHTO,

Pipeline to be constructed in trench excavated entirely in bedrock. In this case the selected fill placed over the bedding to the pipe will be stabilised with minimum 5 % cement by mass and compacted in layers of loose thickness 200mm to minimum 97% Mod AASHTO dry density. This stabilised layer will be taken to the top of the trench at ground surface where it will be built proud by up to 200 mm of the surrounding ground surface. This procedure is required to prevent preferential erosion paths or gulleys forming on the trench line as would be the case with normal (un stabilised) backfill within the trench with shallow bedrock sides.

Pipeline to be constructed on steep slopes where the natural gradient exceeds 1V:3H. This case is similar to (iii) above where it is necessary to limit or prevent preferential erosion over the trench outline. The selected fill placed over the bedding to the pipe will be stabilised with minimum 5 % cement by mass and compacted in layers of loose thickness maximum 200mm to minimum 97% Mod AASHTO dry density. This stabilised layer will be taken to within 200mm of the top of the trench at ground surface. This upper 200mm will be placed with organic rich topsoil from stockpile for re-vegetation.

Depending on the Employer's Agent's assessment either the full length of trench along the steep section or only limited sections not less than 3 metres at intervals of 15 metres along the trench line may be treated in this way. Depending on the assessment of the erodibility potential of the insitu and backfill soils by the Employer's Agent sections of pipeline running down slope in areas flatter than 1V:3H may also require this treatment.

PSLB 3.3 BEDDING

Add the following to Sub-Clause:

Steel pipelines shall be bedded as per Drawing LB-3 (d) of SABS 1200LB where the cradle material and the blanket material up to 300mm above the crown of the pipe, consists of selected granular material.

Portions of the pipeline may warrant the need for soilcrete and will be prepared, placed and compacted as per the relevant drawings.

Concrete stormwater pipes are to be regarded as rigid and shall have Class C bedding as per drawing LB-3 of SABS 1200 LB. Cable ducts shall be regarded as flexible and shall be bedded in accordance with drawing no. LB-2 of SABS 1200LB.

All subsoil pipes shall be bedded in accordance with the typical details shown on the relevant drawings.

PSLB 3.4 SELECTION

Add to Sub-Clause:

Notwithstanding the requirements of sub-clause 3.7 of SABS 1200 DB and sub-clause 3.4.1 of SABS 1200 LB regarding the use of selective methods of excavating, the Contractor shall use selective methods of excavating and shall provide and use plant that will enable him to avoid burying or contaminating material that is suitable and is required for bedding.

PSLB 3.4.1 Suitable material available from trench

Replace the words “(but is not required)” in the fifth line with the words “at his own cost”.

PSLB 3.4.1.1 Selected excavation (New sub-clause)

Add new Sub-Clause:

The Contractor is required to excavate selectively for bedding materials and selected fill materials.

PSLB 3.4.3 Crushed stone bedding (New sub-clause)

Add new sub clause:

Where the conditions on the trench bottom are too wet to use selected granular material as this would not be practical, 19mm single sized crushed stone material from commercial sources will be used to form a pioneer layer. Depending of conditions to be assessed by the Employer's Agent, dump rock might be instructed as a base for the 19mm stone pioneer layer. This will involve the use of geotextile material as instructed.

The use of stone as a pioneer layer is only applicable after approval of the Employer's Agent.

PSLB 5 CONSTRUCTION

PLSB 5.1 GENERAL

Add to sub-clause:

The determination of pipe as “flexible” or “rigid” will be according to the procedure given in section 4.5 of Part 1 of SANS 0102.

PSLB 5.1.2 Details of bedding

Delete and replace with:

Pipes shall be bedded and protected in accordance with the details shown on the drawings.

Although class "C" bedding is required, special bedding mechanisms are required in the vicinity of pumps stations and reservoirs and where road crossings are constructed.

Where pipelines are constructed under roads, selected granular material shall be used as blanket material around the pipe, that is up to 300mm above the pipe, unless pipe is situated in pipe jack. Reference to be made to clause PSLB 3.2.

The cradle thicknesses shall be as follows:

For DN600 and smaller

- Cradle thickness to be 200mm

For greater than DN600

- Cradle thickness to be 300mm

The blanket material thickness above the crown of the medium pressure pipe shall be 300mm for all diameters of pipe.

Steel pipelines treated as slender pipe or flexible pipe shall be bedded as per Drawing LB-3 (d) of SABS 1200LB.

PVC and HDPE pipes shall be regarded as flexible and shall be bedded in accordance with drawing no. LB-2 of SABS 1200LB.

Cable ducts shall be regarded as flexible and shall be bedded in accordance with drawing no. LB-2 of SABS 1200LB.

PSLB 5.1.2.1 Stone drainage layer beneath bedding (New sub-clause)

Add new Sub-Clause:

Where indicated on the drawings, or as otherwise indicated by the Employer's Agent, a 200mm thick layer of 19mm stone shall be placed beneath the bedding layer to act as a drainage channel for excessive ground water. This layer shall be wrapped in an approved geotextile and provided with outlet pipes where indicated on the drawings or as directed by the Employer's Agent, so as to drain away from the pipeline any excess water that accumulated in the trench. The Contractor shall ensure that all the stipulations for handling of ground water in any sub-surface drain are adhered to. Should conditions on site be such that the design does not cater for the specific condition encountered, he shall immediately resort to seeking the advice from the Employer's Agent. The Contractor must be aware that the handling of sub-surface water and the drainage there of is an environmentally sensitive issue.

The Contractor's attention is drawn to the fact that the installation of sub-soil drains will be as per the direction of the Employer's Agent and will only be required after the Employer's Agent has done an inspection in order to assess the suitability of a specific type of sub-soil drain and has approved of same.

PSLB 5.1.3 Placing of bedding

Add to sub clause:

No loose rocks or stones shall be permitted to rest against the pipe barrel during the placement and compaction of the bedding cradle or blanket. In addition to the provisions of clause 5.1.3.3, hand equipment shall be used to compact the bedding material under the haunches and immediately next to the pipe. No vibratory mechanical equipment shall be allowed to make contact with any part of the pipe or be used on the bedding blanket directly above the pipe.

End tipping of bedding directly into trench will not be allowed.

PSLB 5.1.4 Compacting

Delete and replace with:

For continuously welded steel pipelines of diameter DN600 and above, the bedding is to be compacted to 100% MOD AASHTO. For flexible pipes the drawing LB – 3(d) in SABS 1200 LB is applicable.

Compaction for smaller diameter steel pipelines and pipelines of other materials, the compaction density shall be in terms of the requirements on the drawings. Nonflexible pipes shall consist of a class C bedding whilst flexible pipes shall be deemed to have been priced for bedding placement in terms of drawing LB – 3(d) in SABS 1200 LB.

The Contractor shall take steps to ensure that flexible pipes do not deform excessively in cross-section during and after construction and backfilling operations. The maximum deflection which will be acceptable at any stage during or after construction is 5% of the pipe diameter horizontally or vertically. The Contractor will be required to provide the necessary apparatus and to monitor deflection during construction.

Pipe deformations will only be maintained within the specified tolerances by correct backfilling practice. 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 required compaction specified it is required that the bedding material 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 Employer's Agent'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. It is the duty of the Contractor to ensure that pipelines do not float in the bedding material during construction.

Prior to the commencement of pipe laying the Contractor shall submit, to the Employer's Agent for approval, the placing and compacting methods which he proposes to implement in order to ensure compliance with the specification.

Blanket material shall be brought up evenly on either side of the pipe barrel in layers not exceeding 200mm measured loose; and compacted to the required density utilising the required compaction method. Movement and deflection of the pipe shall be avoided.

Particular attention shall be paid to compaction of material in the pipe haunch area. Compaction shall be achieved by hand punning horizontally and obliquely with a suitably sized and shaped hand tool. The Contractor shall take the necessary precautions not to inflict damage to the pipeline coating when compacting the cradle and the blanket material.

All costs for providing the water required for the saturation of the material, temporary retaining measures to prevent backfill material from “flowing” away from point of application, and or retaining measures to terminate a specific

backfill section for whatever reason, shall be deemed to be included in the tendered rates for supply, place and compact of bedding material.

Some materials such as decomposed granite and dolerite may have inherent radioactive mineralogy which may affect the accuracy of the compaction monitoring results when the nuclear density meter method is used to measure compactions. Where such mineralogy results in both erratic and inconsistent measurements it may be necessary as determined by the Employer's Agent, to resort to the standard or reference method of soil density measurement which is the sand replacement test.

The Contractor shall carry out his own quality control testing of the proposed bedding material to ensure that it meets this specification.

At least one grading analysis should be carried out for every 250 metres, per layer, of bedding placed. The results of these tests shall be forwarded to the Employer's Agent within 24 hours of completion of the test. Should the material not comply with the specification, the Contractor shall remove and replace material not complying with the specification, with approved material, at his own cost.

Should the Contractor change the source of the bedding material, or should the bedding material come from a new location within a quarry, samples of the proposed material shall be supplied to the Employer's Agent, inclusive of the analysis of the characteristics of the material. Only after the Contractor has received written approval from the Employer's Agent, may he proceed with placing of the new selected granular bedding material.

The costs for the grading analysis tests shall be included in the tendered rates for the supply, placement and compaction of the selected granular material.

No extra payment will be made for forming or filling joint holes (pockets).

PSLB 5.1.5 Testing (New sub-clause)

Add new sub-clause:

Flexible and flanged joints shall be left exposed with a minimum of 300 mm clearance around the bottom of the pipe during hydraulic pressure testing of the pipe to facilitate inspection.

PSLB 5.2 PLACING AND COMPACTING

Add to sub clause:

Rates for bedding and selected fill placement are deemed to be included for the filling of fox holes.

PSLB 5.2.2 Class 'C' bedding

Delete the third, fourth and portion of the fifth lines of the Sub-Clause 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 Drawing 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 Drawing LB-1 (c)."

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 PRINCIPLES

All rates provided for bedding placement and compaction shall be deemed inclusive of all machinery and plant required to work under all width conditions. For this purpose, rates for trench compaction shall include for narrow width compaction with suitable compaction equipment and machinery. On the opposite end of the scale, compaction rates for, for example, road layer works, shall be fully inclusive of the typical plant and equipment used for road layer works.

PSLB 8.1.1 Supply of bedding materials separately

Add to sub clause:

The measurement of bedding shall be the total through length along the centre of the pipeline measured horizontally with deductions made for the line valve chamber.

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.
- (d) No additional payment will be made for bedding material placed in bell (fox) holes

The tendered rate for bedding shall not be re-negotiated as a result of a change in supplier.

PSLB 8.1.4 Separate items for cradle and blanket

Delete Sub-Clause and replace with:

Separate items are scheduled for material for the bedding cradle and for the bedding blanket material, to provide for the probability that the excavated material from the trench is more likely to comply with the requirements for the latter than the former.

The tendered rates for the supply of cradle and blanket material shall include for the supply of same at all grades and no additional financial compensation for the supply of bedding at steep grades will be considered.

PSLB 8.1.5 Disposal of displaced material

Delete the first sentence and replace with:

Material displaced by the pipeline and by importation of material from sources other than trench excavation, shall be disposed of offsite to an approved spoil disposal site. No additional payment for such disposal will be entertained.

No overhaul shall be paid.

PSLB 8.1.6 Free haul

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 SCHEDULED ITEMS

PSLB 8.2.1 Provision of bedding from trench excavation

Delete the Sub-Clause and substitute the following:

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 along the trench excavation as may be selected by the Employer's Agent, 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.

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, filling of joint holes and completing the bedding around and over the pipeline, as well as placing of selected fill material.

PSLB 8.2.1.1 Extra over for screening (New sub-clause)

Add new Sub-Clause:

The unit measurement shall be cubic metre (m³).

The rates shall cover the cost of screening or otherwise treating excavated material, at any point along the trench excavation as may be selected by the Employer's Agent, 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.

The rate provided against the volumetric unit shall be applicable to the volume of material produced in terms of the required specification and not the volume of material screened in the first instance.

The Contractor shall base his rate on a yield volume of 60%.

PSLB 8.2.2 Supply only of bedding by importation

Delete the sub-clause and substitute the following:

Including for screening and/or other treatment:

- | | | |
|----|----------------------------|----------------------|
| a) | Selected granular material | Unit: m ³ |
| b) | Selected fill material | Unit: m ³ |

The rates shall cover the cost of acquiring, loading, transporting, offloading, screening or otherwise treating excavated material 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 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 8.2.2.3 From commercial sources (Provisional)

Delete the Sub-Clause and substitute the following:

Material measured under this item to be sourced from commercial sources by Contractor:

- | | | |
|----|----------------------------|----------------------|
| a) | Selected granular material | Unit: m ³ |
| b) | Selected fill material | Unit: m ³ |

The rates shall cover the cost of acquiring, loading, transporting, and, offloading 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 and of disposing of displaced material. No overhaul shall apply.

PSLB 8.2.4 Encasing of pipes in concrete

Add to Sub-Clause:

The rate for concrete encasing shall include for the supply, installation and stripping of all formwork.

Where river crossings are applicable and the drawings specify concrete encasement with stone pitching, the rate for concrete encasing shall include for such stone pitching stone which is retrieved from pipe trench excavations in the vicinity of the river crossing or retrieved from the immediate area.

Expansion/contraction joints to be as instructed by the Employer's Agent.

PSLB 8.2.6 Drainage layer (New sub-clause)

- | | | |
|----|---|----------------------|
| a) | Supply and place stone filling beneath pipe | Unit: m ³ |
|----|---|----------------------|
- The rate shall be for a 150mm deep crushed stone layer as ground water drainage measured according to a width equal to the base widths. 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).

- b) Supply and installation of geofabric filter material
(BIDIM Grade A4 or similar) around stone

Unit: m²

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.

DRAFT DO NOT USE

PSLC CABLE DUCTS (SABS1200LC)

PSLC 3 MATERIALS

PSLC 3.1 DUCTS

Add the following to Sub-Clause:

Ducts for cables shall comply with SANS 966 (un-plasticised polyvinyl chloride pipes). The pipes shall be 110mm or 160mm dia. Normal duct class with spigot and socket rubber ring joints.

Both ends of each duct must be sealed with an end cap.

Ducts for relocated or new telephone cables shall be 110mm dia. uPVC coreflow pipes as provided by Telkom.

PSLC 3.4 CABLE DUCT MARKERS

Add the following to Sub-Clause:

The end of each cable duct installed shall be marked with a cable duct marker as indicated on the relevant drawings

Further to the above "record" information giving exact co-ordinates and levels at each end of a duct and the size of duct laid at each road crossing shall be supplied to the Employer's Agent in writing or electronically in the format specified in Clause PA 1.7 within one week of installation. The above shall be included in the rates for cable duct markers."

PSLC 5 CONSTRUCTION

PSLC 5.1 EXCAVATION OF TRENCHES

Add to Sub-Clause:

All ducts shall be laid with a minimum of 800mm cover under roads and shall extend to within 0.1 m of the position provided on the drawings or at least 500mm beyond the kerb line. Where paved footpaths are present or are to be provided in the future the ducts shall extend at least 500mm beyond the paved footpath.

All excavation quantities for cable ducts are measured under PSDB.

PSLC 5.3 DUCT LAYING

PSLC 5.3.3 Draw wire

Add the following to Sub-Clause:

The ends of all cable ducts shall be sealed using suitable end caps.

PSLC 5.9 DUCT ROUTE MARKERS

Add to Sub-Clause:

The tendered rates shall include for providing the Employer's Agent with the record information and supplying and installing the markers as specified under PSLC 3.4. This information is required by the relevant service authorities.

PSLC 8 MEASUREMENT AND PAYMENT

PSLC 8.2.2 Excavation

Add to Sub-Clause:

Measurement for cable ducts will be done under PSDB – Measurement

PSLC 8.2.5 Supply, Lay, Bed and prove duct

Delete Sub-Clause a) and b) and replace with:

PSLC 8.2.5(a) Telkom ducts

Delete Sub-Clause and replace with:

All pipes, draw wire, screen wire and duct markers will be supplied by Telkom to the construction site at no cost to the Contractor. All ducts shall have a minimum cover of 600mm from finished road level to the top of the pipe. All ducts are to extend 1 000mm either side of the road edge. Trench width for single and double pipes shall be 375 mm and 450mm respectively.

The tendered rate shall include full compensation to install the ducts as specified. Excavation and backfilling shall be measured under items specified for trench excavation.

The unit of measurement shall be

Unit: m

PSLC 8.2.5(b) Electricity ducts

Delete Sub-Clause and replace with:

The ducts shall consist of the indicated number and size as specified in the Bill of Quantities. All ducts are to be laid at 800mm below finished road level and the pipe must protrude 500mm into the footpath or road verge on either side. Both ends of each duct must be sealed with an end cap. In addition, it is essential that the location of the ducts must be marked on site and to facilitate subsequent location, suitable kerb or markers shall be obtained from the Service Units Depot. These kerbs or markers will be supplied free of charge.

The tendered rate shall include full compensation to supply, lay, bed and prove the ducts as specified. The tendered rate shall include for obtaining the kerbs or markers from the Service Units Depot and placing them where required.

Excavation and backfilling shall be measured under items specified for trench excavation.

The unit of measurement shall be.

Unit: m

PSLC 8.2.5(c) Water ducts (New sub-clause)

Add new Sub-Clause:

The ducts shall consist of the indicated number, class, material and size as specified in the Bill of Quantities. Ducts shall have a minimum cover of 600mm and a maximum cover of 800mm measured from the top of the kerb. The duct shall be stenciled with 40 mm letters in blue paint on the kerb or road edge as follows: W DUCT. Ducts shall extend at least one metre past the line of the future water main trench and at least 1.5m from the edge of the road

on the opposite side of the road. The ends of the ducts shall be blocked off with an end cap to prevent the ingress of soil.

An 8 gauge galvanised wire shall be drawn through the ducts and secured to wooden stakes located approximately 150mm off the cadastral boundary on either side of the road.

The tendered rate shall include full compensation to supply, lay, bed and prove the ducts as specified.

Excavation and backfilling shall be measured under items specified for trench excavation.

The unit of measurement shall be

Unit: (m)

PSLC 8.2.8 Cable markers

Add to Sub-Clause:

a) Cable duct markers

.....Unit: No

PSLC 8.2.10 Construct 450mm by 450mm precast portal culvert for Telkom fibre optic protection complete with excavation and backfill 0.0m to 1.0m in depth

Add new Sub-Clause:

The unit of measure shall be the linear metre measured along the soffit of the precast portal culvert installed.

The rate shall cover the cost of supplying, testing, loading, transporting, and off-loading together with provision and placing of the selected granular material where required for bedding and installation, laying, jointing, cutting on site, and waste.

The rate shall also cover the necessary excavation, backfilling and precautionary measures required for the installation.

Unit: m

PSLE STORMWATER DRAINAGE (SABS 1200LE)

PSLE 3 MATERIALS

PSLE 3.1(a) Precast concrete pipes

Delete Sub-Clause and replace with:

Concrete pipes shall be of reinforced concrete and shall comply with SANS 677 and be of the class as indicated on the drawings or scheduled in the Bill of Quantities.

PSLE 3.1 (d) Skewed ends

Add to the Sub-Clause:

Wherever required skew ends may be cut on site.

PSLE 3.1 (f) Pipes for subsoil drains (New sub-clause)

Add new Sub-Clause:

Pipes for subsoil drains shall have the specified internal diameter, which shall not be less than 100 mm, and shall be slotted uPVC or HDPE pipes with a wall thickness in accordance with Class 4 pressure pipes to SANS 966.

The size of the perforations in perforated pipes shall in all cases be 8 mm $\pm$ 1,5mm diameter and the number of perforations per metre shall not be less than 26 for 100 mm pipe and 52 for 150 mm pipe. Perforations shall be spaced in two rows for 100 mm pipes and four rows for 150 mm pipes.

Slotted uPVC or HDPE pipes shall have a slot width of 8 mm with a tolerance of 1,5mm in width. The arrangement of slots shall be to the Employers Agent's approval but the total slot area shall not be less than specified for the perforations.

PSLE 3.4.1 Bricks

Add to Sub-Clause:

Cement bricks complying with the relevant requirements of SANS 1215 bricks shall be considered as being acceptable.

PSLE 3.4.3 Manhole covers, grid inlets, etc.

Add to Sub-Clause:

All cast iron fittings shall receive the following corrosion protection:

One coat epoxy zinc chromate oxide primer to SANS 929. The Dry film thickness to be 35 microns. The final two coats to be epoxy tar in different colours, the final coat to be black. The Coating time to be as per the manufacturer's instructions. The Dry film thickness to be 225 microns.

PSLE 3.6 CONCRETE (NEW SUB-CLAUSE)

Add new Sub-Clause:

Concrete shall comply with the relevant requirements of SABS 1200 G or SABS 1200 GA, whichever is included in the project specification.

PSLE 3.7 PERMEABLE MATERIAL FOR GROUNDWATER DRAINS

Delete Sub-Clause and replace with:

Permeable filter materials for groundwater drains shall consist of crushed stone of suitable gradings.

Permeable materials shall conform to the following requirements:

- Crushed stone shall be clean, hard single sized stone and shall be free from shale, clay and other deleterious substances.
- The aggregate crushing value of the stone shall not exceed 30 when tested in accordance with TMH 1 Test Method B1.

PSLE 5 CONSTRUCTION

PSLE 5.3.1 Culvert construction after earth fill (New sub-clause)

Add new Sub-Clause:

Wherever possible pipes and rectangular culverts shall be laid under trench conditions.

The compacted fill shall first be constructed to a height of 300 mm above the culvert before excavating for the culvert.

The trench width shall not exceed the outside diameter of the pipe plus 600 mm. A working width of 600 mm each side shall be allowed for rectangular culverts.

PSLE 5.2.2 Pipe culverts

Add to Sub-Clause:

The bedding for stormwater pipes shall be to the requirements for Class C bedding of SABS 1200 LB, unless otherwise specified or shown on the drawings.

The ogee joints shall be fitted with 200 mm x 6 mm rubber sealing collars conforming to the latest SANS 974 Specification and with a shore hardness of approximately 40 degrees, or alternatively, the ogee joints shall be primed and double wrapped in accordance with the manufacturer's recommendations with 200 mm wide wrapping tape type CDP or similar approved.

PSLE 5.2.3 Concrete casing of pipelines

In second line of the Sub-Clause substitute "Grade 15/19" for "mix 15".

PSLE 5.2.6 Construction of groundwater drains (New sub-clause)

Add new Sub-Clause:

On completion of excavation the trench shall be lined with geotextile as specified or shown on the drawings.

A layer of permeable material of the class and thickness as shown on the drawings shall be placed on the bottom of the trench and lightly tamped and finished to the required gradient.

Pipes of the type and size required shall then be firmly bedded on the permeable material true to level and grades coupled where required and the trench backfilled in layers not exceeding 100mm with further permeable material to such height above the pipes as shown on the drawing or directed by the Employer's Agent. The permeable material shall be lightly compacted and finished to the required level. The trench must be specially protected against the ingress of water before completing the impermeable layer.

When placing successive layers, the lower layer must not be walked on or disturbed more than can be avoided. Care shall be taken to prevent the contamination of permeable material during construction of the groundwater drains and all permeable material contaminated by soil or silt shall be removed and replaced by the Contractor at his own expense.

Where plain butt joint pipes are used, they shall be laid firmly together to prevent infiltration of backfill material. Perforated and slotted pipes shall be joined by couplers. Perforated pipes shall be laid with the perforations at the bottom, as instructed.

The higher end of groundwater pipe drains shall be sealed off with a cap or loose concrete cap of Class 20/19 concrete, as shown on the drawings, and at the lower end the pipe drain shall be built into a concrete headwall providing a positive outlet or connected to stormwater pipes or culverts.

PSLE 5.8 OPEN DRAINS (NEW SUB-CLAUSE)

Add new Sub-Clause:

Open drains are to be constructed to the details shown on the drawings, or as directed by the Employer's Agent, to the correct line, level and cross-section. The material excavated from open drains is to be stockpiled for future cover.

Measurement of open drain excavation shall be calculated from natural ground level or, in the case of drains within a road reserve, from the reduced level in the road excavation, and payment will be made on a rate per m3 basis irrespective of depth. The rate is to include for all work required to trim the drain(s) to the correct line and level.

PSLE 5.9 STONE PITCHING (NEW SUB-CLAUSE)

Add new Sub-Clause:

Where ordered by the Employer's Agent, open drains, stormwater outlets, etc, shall be pitched with stone. Stone for pitching shall be of good, sound, durable rock of good shape and face, with a minimum size of 100 x 100 x 75 mm deep. Before pitching is commenced, all slopes and surfaces to receive pitching shall be carefully trimmed and dressed to the correct lines and grades. The pitching stones are to be laid with joints broken as much as possible and are to be hammered solid into position to present a regular and uniform surface. All joints are to be grouted to their full depth in 4:1 cement mortar.

Payment for stone pitching will be made at a rate per unit finished area and the rate is to include for all trimming and dressing of the excavation, laying of the stones and grouting of the joints :Unit : m²

PSLE 5.10 CUTTING OF DRAINAGE PIPES (NEW SUB-CLAUSE)

Add new Sub-Clause:

As far as possible, culvert lengths shall be such that pipe units need not be cut. Should any straight or skew cuts be necessary, such cutting will not be measured and paid for separately in terms of Sub-Clause 8.2.4 since all additional work required in cutting the pipes as well as the wasted pipe ends shall be regarded as being included in the payment for the supply, lay, joint, bed and test of the relevant pipe culverts, as per Sub-Clause 8.2.1.

PSLE 8 MEASUREMENT AND PAYMENT

PSLE 8.2 SCHEDULED ITEMS

PSLE 8.2.1 Supply and lay concrete pipe culverts

Delete the title of the Sub-Clause and substitute with:

SUPPLY, LAY, JOINT, BED AND TEST PIPELINES

Add to Sub-Clause:

The bedding shall be Class C, unless otherwise specified or shown on the drawings.

Add to the Sub-Clause:

The rates shall cover the cost of providing the pipes as well as the cost of laying, bedding, jointing and making connections into manholes and testing the pipeline.

PSLE 8.2.4 Extra over items 8.2.1 and 8.2.2 for cutting end units for culverts on site

Delete this Sub-Clause as no extra payment will be made for cutting end units for culverts.

PSLE 8.2.8 Supply and install manholes, catch pits and the like

Delete the words "*but excluding excavation and backfilling, which will be measured separately*" and replace with "and including dealing with any excavation (in all materials including disposal of surplus) that is additional to that measured under the item for pipe trench excavation, backfilling and compacting. The rate shall also cover the cost of all reinforcing, formwork, epoxy coating of cast iron fittings and the requirements complying with the safety and protection requirements of Sub-clause 5.1 of SABS 1200 DB"

PSLE 8.2.14 Subsoil drains (New sub-clause)

Add new Sub-Clause:

The tendered rate shall cover the cost of acquiring, regardless of distance, the required material from commercial sources, delivering it to points alongside the trench spaced to suit the Contractor's method of working, plant and labour and the disposal of material displaced by such importation at the designated spoil site.

Excavation for subsoil drains shall be measured as per SABS 1200DB.

PSLE 8.2.15 Minor drainage structures (New sub-clause)

Add new Sub-Clause:

Catch pits, manholes, drop inlets and headwalls will be measured and paid for as complete units.

The unit of measurement shall be the number of the particular type, size and category of drainage units supplied, constructed and installed in accordance with the drawings.

The tendered rate shall include for all materials, plant, labour, supervision and incidentals for the construction of the drainage units complete and in accordance with the drawings.

The tendered rate shall further include for all necessary excavation in all materials, backfilling and disposal of surplus materials, formwork, concrete, benching, concrete finish, reinforcement, precast elements, steel channels and grids, step irons and all other items not specifically measured elsewhere necessary for completion of the unit in accordance with the drawings.

The tendered rate shall include for all costs involved in complying with the requirements of the relevant specifications in respect of the individual types of work involved in completion of the units.

The tendered rates shall exclude for excavation in intermediate and hard material, payment for which shall be made as an extra over in the Schedule of Quantities.

Supply, construct and install drainage unit of the type, size category and depth stated in the Bill of Quantities
Unit: No

PSLE 8.2.16 Outlet headwalls (New sub-clause)

Add new Sub-Clause:

The tendered rate shall cover the cost of all materials, plant, labour, additional excavation and disposal required to construct the headwall complete as per the detail provided for DN375, DN450, DN600, DN900 and DN1500 pipes.

PSLE 8.2.17 Break into existing manhole, drop inlet or catch pit and install new pipe (New sub-clause)

Add new Sub-Clause:

- | | |
|--------------------------|----------|
| i) 375mm diameter pipe | Unit: No |
| ii) 450mm diameter pipe | Unit: No |
| iii) 600mm diameter pipe | Unit: No |

iv) 900mm diameter pipe

Unit: No

The rate shall include all labour, plant and materials necessary to break into the existing stormwater structures and to install new pipes and repair the benching. The rate shall include for disposing of rubble and excess material, regardless of distance.

PSLE 8.2.18 Supply, lay and bed slotted subsoil pipes 110mm diameter in HDPE (Drainex or similar approved) (New sub-clause)

Add new Sub-Clause:

Unit of measurement

Unit: m

The rate shall include for supplying, jointing, laying and bedding pipes, lubricants, joints, cutting, trimming and waste. No deductions will be made for specials, junctions, etc. Slotted pipes shall be HDPE pipes to comply with SANS 4427 Part II.

PSLE 8.2.19 Extra over clause PSLE 8.2.18 for pipe junctions

Add new Sub-Clause:

The rate shall include for supplying, jointing and laying all junctions, cutting, trimming and waste, joints and lubricants. Junctions will be made with standard uPVC soil or HDPE and drainage fittings. Unit: No

PSLE 8.2.20 Extra over clause 8.2.18 for capping pipe ends with geofabric (U24 or similar) New sub-clause)

Add new Sub-Clause:

The rate shall include for all labour, plant and materials to cap pipe end with two layers of geofabric securely tied to the pipe 100mm from the end with binding wire. Unit: No

PSLE 8.2.21 Extra over clause 8.2.18 for building pipes into manhole (New sub-clause)

Add new Sub-Clause:

The rate shall include for all labour, plant and materials to build subsoil pipes into concrete or brick manholes. Unit: No

PSLB 8.2.22 Extra over clause 8.2.18 for rodding eyes (New sub-clause)

Add new Sub-Clause:

The rate shall include for all labour, plant and materials to construct the rodding eye complete as shown on the project drawings. Unit: No

**PSLE 8.2.23 Protective concrete (grade 20/19) cover slabs complete (1000mm wide by 150mm thick)
(New sub-clause)**

Add new Sub-Clause:

The unit of measure shall be the cubic meter of concrete provided according to the authorised dimensions of the protective concrete cover slabs. The rate shall include preparing the surface, providing and placing a plastic membrane over the granular surface, excavation into the side of the trench (if required), formwork, providing and casting the concrete in 2m long panels and finishing the concrete surface by means of a wood float finish. All plant labour and material costs to construct the protective cover slabs complete, shall be included in the tendered rate.
Unit: No

DRAFT DO NOT USE

PSMM ANCILLARY ROAD WORKS (SABS 1200MM)

PSMM 2.1 SUPPORTING SPECIFICATIONS

Add to Sub-Clause:

The South African Road Traffic Signs Manual (1993) forms part of this specification as well as the attached Transportation Management Plan.

PSMM 3 MATERIALS

PSMM 3.1 GUARDRAILS, POSTS AND REFLECTOR PLATES

PSMM 3.1.1 Guardrails

Add to Sub-Clause:

Guardrails and end wings shall be galvanised with a hot-dip (galvanised) zinc coating which complies with the requirements of SANS 763 for the coating of type A 1 articles.

All bolts, nuts and washers shall have a hot-dip (galvanised) zinc coating which complies with the requirements of SANS 763 for the coating of type C1 articles.

PSMM 3.1.2.1 Timber

Add to Sub-Clause:

Timber for use in guardrail posts and spacer blocks shall be treated hardwood.

PSMM 3.2 ROAD SIGNS

PSMM 3.2.1 General

Add to Sub-Clause:

Road signs are not detailed on the drawings. They shall, however, conform to the requirements of the latest South African Road Traffic Signs Manual.

The supports do not require breakaway devices.

PSMM 3.2.9 Retro reflective material

Add to Sub-Clause:

The background for the signs shall be reflectorised and the material shall be of Employer's Agenting grade complying with the requirements of CKS 191.

PSMM 5 CONSTRUCTION

PSMM 5.2 ROAD SIGNS

PSMM 5.2.1 Manufacture of supports and backing plates

PSMM 5.2.1.1 Supports

Add to Sub-Clause:

The supports shall be 60mm nominal diameter galvanised tubing to SANS 657 with a nominal wall thickness of 2,0mm.

Each support shall be drilled as necessary to support the relevant sign and shall have a 12mm mild steel rod, 200mm long, welded in position in a hole drilled at right angles to the axis of the tube, at 85mm from the lower end, so as to project equally on either side of the tube and prevent the tube from being rotated when erected. All structural members used shall be treated to resist corrosion by hot dipped galvanising and by painting with one coat of calcium plumbate primer and two coats of grey enamel. All structural members used with aluminium sign faces shall be properly insulated against galvanic action by painting the contact surfaces with an approved bitumastic paint and shall be bolted together with 12,7mm (1/2") diameter cadmium plated bolts.

PSMM 5.2.1.2 Backing plates and boards

Add to Sub-Clause:

Statutory signs shall be constructed from 2,0mm thick aluminium alloy flat sheet to BS EN 485-2:2008 hardened to 3/4 :H. The signs shall have suitable mounting brackets to facilitate mounting to the supports. Stainless steel mounting bolts are preferred and should be insulated from the aluminium by suitable plastic washers.

PSMM 5.2.4 Erection of road signs

Add to Sub-Clause:

Road signs shall be erected so that the lower edge of the sign is a minimum of 2,10m above final ground level.

PSMM 5.3.6 Road studs

Add to Sub-Clause:

Road studs shall be extruded aluminium "Lynkor Lynx" with a 43 element reflector fitted with a M10 x 35mm anchor shank for use on asphalt surfacings.

All road studs are to be installed by the manufacturer or an approved and registered sub-contractor or the manufacturer.

PSMM 5.5 ACCOMMODATION OF TRAFFIC (NEW SUB-CLAUSE)

Add new Sub-Clause:

Subject to the provision contained in SABS 1200 MM: 1984, the tendered rates shall include for the following:

PSMM 5.5.1 Scope (New sub-clause)

Add new Sub-Clause:

This section covers the construction and maintenance of the necessary temporary deviations and detours, barricades and signs, and everything necessary for the safe and easy passage of all public traffic during the construction and maintenance periods, and also the obliteration of temporary deviations as they become

redundant. The section also covers the accommodation of traffic on existing roads without the deviation of traffic onto temporary deviations.

PSMM 5.5.2 General requirements (New sub-clause)

Add new Sub-Clause:

(a) Safety

The Contractor shall be responsible for the safe and easy passage of public traffic past and/or over sections of roads of which he has occupation. Traffic accommodation and temporary construction signing is the sole responsibility of the Contractor. The Contractor shall at all times in all his operations and in using his construction plant, take the necessary care to protect the public and to facilitate the flow of traffic. The Contractor may not commence with any part of the works before he has made adequate provision for the accommodation of traffic. If work has to be done under traffic, the Contractor shall see to it that his employees are clearly visible.

In order to ensure that the traffic accommodation strategies are performing as intended, the Contractor shall monitor and maintain traffic accommodation at the work zone on a regular basis.

The Contractor shall monitor all traffic control devices, temporary signing and roadway conditions during periods of inactivity. The frequency of inspection shall be commensurate with the traffic volumes in the sector and under no circumstances shall consecutive inspections be more than six hours apart, unless otherwise agreed by the Employer's Agent. All site inspections shall be documented by the Contractor and made available for the Employer's Agents review upon request. The traffic accommodation measures will be monitored by the Employer's Agent and if, in the opinion of the Employer's Agent, traffic is being unduly hindered, the Contractor may be required to modify his traffic accommodation measures.

In cases where the Contractor is not in compliance with the specifications and, in the opinion of the Employer's Agent, there is imminent danger to the travelling public, the Employer's Agent has the authority to order the immediate suspension of Work until the required improvements to the situation have been made.

In other cases, where the Contractor is not in compliance with the specifications but, in the opinion of the Employer's Agent, the infraction is not causing imminent danger to the travelling public, the Employer's Agent will use the following escalating process to address the situation:

- (i) Issue verbal instructions requiring the Contractor to correct the infraction
- (ii) Issue a written warning instructing the Contractor to correct the infraction
- (iii) Issue a written order instructing the Contractor to suspend Work until the infraction is corrected to the satisfaction of the Employer's Agent where such instruction on suspension shall not entitle the Contractor to any compensation for delay.

(b) Providing temporary deviations

Except where the existing road is to remain in use for through traffic, the Contractor shall provide, construct or put in order such temporary deviations as may be required for deviating traffic from such sections of the road as are handed over to him.

Should the Contractor prefer to build temporary deviations at his own initiative in stead of complying with the requirements of the specifications, he shall obtain the Employer's Agent's prior written approval. If the Employer's Agent's prior written approval has been obtained, the Contractor will be remunerated for the accommodation of traffic up to an amount that does not exceed the tendered amount for the accommodation of traffic in accordance with the specifications.

(c) Minimum vertical clearance

The minimum vertical clearance over any section of a temporary deviation shall be 5,2m.

If the minimum clearance available is less than 5,2m, the minimum clearance shall be indicated on approved signs at approved locations on and in advance of the obstruction.

(d) Property and survey beacons

Where possible, temporary deviations shall be constructed so as not to damage or displace property or trigonometrical-survey beacons. In exceptional cases where this is not possible, the Contractor shall notify the Employer's Agent in good time so that he may arrange to have them suitably referenced before they are displaced.

(e) Access to properties

The Contractor shall provide and grant access to persons whose properties fall within or adjoin the area over which he is working. No separate payment will be made for the provision and maintenance of such accesses and facilities, except for access ramps as specified in PSMM 5.5.18.

f) Approval of temporary deviations

The need for and details concerning all temporary deviations shall be approved by the Employer's Agent before the construction of such temporary deviations commences, and the Contractor shall satisfy himself before tendering that he can make arrangements in respect of any temporary deviations as may be necessary for the safe and convenient passage of traffic.

g) Temporary works

The temporary deviations provided by the Contractor shall include the construction of temporary gates, fences, drainage works, and other incidentals considered by the Employer's Agent to be necessary.

h) Public services

Public services affected by temporary deviations shall be treated in a similar manner as services affected by the permanent works and payment shall be made in accordance with the provisions of SABS 1200A Clause 8.8.4.

i) Traffic Safety Officer

The safety of the traveling public is of utmost importance and every effort must be made to ensure that all road signs, barricades, delineators, flagmen and speed controls are maintained and are effective and that courtesy is extended to the public at all times.

The Contractor shall appoint a competent person on site who shall be the responsible person for the arrangements and maintenance of all accommodation of traffic measures required for the duration of the contract.

This person shall be referred to as the Traffic Safety Officer, shall have representatives in each sector and shall liaise daily with the Employer's Agent in order to maintain proper traffic arrangements at all work fronts. The Traffic Safety Officer shall be qualified, trained and experienced in traffic control and must be knowledgeable in the operation of the traffic control devices and other related equipment.

The Traffic Safety Officer shall be required to perform the following duties and this list shall not be deemed to be comprehensive. He/she shall:

- (i) be responsible for keeping the temporary traffic accommodation requirements up to specification 24hours a day 7 day a week
- (ii) compile and maintain a complete daily record of traffic signs installed and the traffic signs sequence at each location during the execution of the contract
- (iii) inspect and report to the Employer's Agent on the state of all required road signs as often as the Employers Agent may require but in any event not less than once every six hours or at such other intervals as may be specified
- (iv) exercise control in terms of traffic safety over the safe movement of personnel, visitors and plant on site including the wearing of high visibility clothing, the operation of amber flicker lights, and the display and cleanliness of "construction vehicle" signs, all as specified
- (v) exercise responsibility for keeping road signs and traffic cones clean and visible at all times. The Contractor shall remove all bituminous and other foreign matter from road signs and traffic cones or provide new road signs and traffic cones, all at the Contractor's own cost, and all as directed by and to the approval of the Employer's Agent
- (vi) compile complete records of traffic accident scenes which are in any way connected with construction activities, and draw up accident reports (including photographs)
- (vii) attend to the training and performance of flagmen and all other personnel involved in the control of traffic
- (viii) attend to all complaints and claims from the public with regard to traffic safety and report on such matters to the Employer's Agent.
- (ix) Liaise with the Publicity Company staff, appointed by the Employer, in order to ensure that communications effort of the Employer is supported at all times in terms of the guidelines for communication as established during the execution of the Contract.

The Traffic Safety Officer and his representatives shall be provided with suitable transport in order to execute their duties.

PSMM 5.5.3 Temporary traffic control facilities (New sub-clause)

Add new Sub-Clause:

The Contractor shall provide, erect and maintain the necessary traffic control devices, road signs, channelization devices, barricades, warning devices, temporary signals and road markings (hereinafter referred to as traffic control facilities), as shown on the drawings and in the Transportation Management Plan, move these traffic control facilities from location to location as required and shall remove them when no longer required. It shall be incumbent upon the Contractor to see to it that the above-mentioned traffic control facilities are present at all time and are functioning properly, but, prior to any section of the road which requires the above facilities being opened to traffic, the Contractor shall submit his proposals in this regard to the Employer's Agent for his information and approval.

The Contractor shall immediately, at any time of the day or night, on a 7 day a week basis, make good any shortcomings to the temporary traffic control facilities, should it become necessary. (See requirements for 24 hour response teams)

The proceedings, claims, actions, damages and costs which may arise from or be related to the absence or improper functioning or placement of traffic control facilities shall be the responsibility of the Contractor. Traffic control facilities no longer required may be moved for re-use, and, if no longer suitable for use, shall be replaced without any additional compensation if they are required for re-use.

The type of construction, spacing and placement of traffic control facilities shall be in accordance with the prescriptions and recommendations of the latest edition of the South African Traffic Signs manual, the Transportation Management Plan and in accordance with the instructions and drawings of the Employer's Agent.

The tendered rates shall be deemed to include for the supply, erection, maintenance, operation and relocation of the said traffic control facilities. It shall also include for the replacement of same as and when required.

The various traffic-control facilities which may be required are the following:

(a) Traffic-control devices

Traffic-control devices include the use of flagmen, portable STOP and GO-RY signs, and traffic signals, whichever may be required. Traffic signals shall be erected only if so specified in the project specifications or upon an instruction in writing, by the Employer's Agent.

If the road is partially closed and one-way traffic only is allowed over a section of road of which the length exceeds 250m, the traffic shall be regulated by flagmen and STOP and GO-RY signs at both ends of such section. It is necessary for effective communication between the flagmen. An approved two-way communication system shall be in operation at the control points.

Temporary traffic control facilities, if applicable, shall be provided with portable stands adequately ballasted with sandbags to prevent the signs from being blown over by wind or wind turbulence from moving traffic, whenever they are used in a situation where the temporary signs must be relocated frequently.

(b) Road signs and barricades

Road signs shall include all the statutorily required road signs in the permanent or temporary series, which shall also include delineators and moveable barricades (the barricade, sign combination type), or an appropriate combination thereof.

(c) Channelization devices and barricades

Channelization devices shall include delineators, cones, barricades, guardrails, barriers, road studs or road markings, or any appropriate combination of these devices.

(d) Road Barriers

Road Barriers for preventing vehicles from leaving the permitted lanes may consist of movable barriers (for example the New Jersey type or similar approved) of approved construction for separating two opposite traffic streams, or ordinary guardrails.

Should road barriers as specified under PSD, be utilized as part of the layout required for managing traffic in terms of figure 2 to 7 (Transportation Management Plan) additional payment for such barriers will not be applicable as the tendered rates for accommodation of traffic shall be deemed to include for the use of such barriers.

(e) Warning devices

All construction vehicles and plant used on the works shall be equipped with rotating amber flashing lights. All lights shall be visible at all times and from all sides. The flashing lights shall be switched on at all times when the vehicles and plant are used on the site for the execution of the works.

Warning boards shall be mounted on construction vehicles and plant and shall be clearly visible. The words CONSTRUCTION VEHICLE shall be displayed on these boards in 250mm high red letter on a white background.

No separate payment will be made for the supply of flashing lights and warning boards and the installation thereof on construction vehicles and plant.

(f) Road Markings

Road markings may be required on bituminous and concrete surfaces and will include road-marking studs wherever necessary. Any painted road markings which no longer apply shall be removed. Road-marking studs shall be removed completely.

PSMM 5.5.4 Width and length of temporary deviations (new sub-clause)

Add new Sub-Clause:

The roadway width of gravel temporary deviations accommodating two-way traffic shall be not less than 10m. Where temporary deviations consist of two separate one-way lanes, the minimum usable width of each lane shall be not less than 5m.

In the case of a two-lane temporary deviation the total width of the carriageway shall be 8.5m and, if a bituminous surface is provided, it shall comprise two lanes of 3.5m width each and centrally located on the roadway. A single lane temporary deviation shall have a 5.0m wide carriageway and, if required, a centrally located 3.5m wide surfaced lane.

Because of the limitation on overtaking in the case of single lane temporary deviations, such deviations shall be as short as possible with a maximum length of 1.0km.

If wider temporary deviations are required, such widths shall be specified in the project specifications and/or on the drawings.

PSMM 5.5.5 Temporary drainage works (New sub-clause)

Add new Sub-Clause:

All stormwater installations shall be measured under the relevant items in the Bill of Quantities for permanent work.

The Contractor shall adhere to the requirements of the Environmental Management Plan, Stormwater Management Plan which he has to draw up for the construction period and dealing with water in terms of the specifications.

PSMM 5.5.6 Earthworks for temporary deviations or haulage routes (New sub-clause)

Add new Sub-Clause:

The Contractor shall shape and grade the temporary deviations and shall make full use of all material that can be obtained from alongside the temporary deviations, from side cuts or from the immediate vicinity. If an adequate quantity of material cannot be obtained in this manner, he shall import material from other sources. Where necessary, cuttings shall be made to obtain a satisfactory vertical alignment. The Contractor shall also perform the necessary clearing and grubbing, including the removal of all trees and stumps. Where the subgrade is not

sufficiently dense in its natural state, it shall be scarified to a depth of 200mm, mixed, watered, and compacted to 90% of modified AASHTO density.

Any fills which may be necessary for any reason, e.g. for the construction of fords, shall be constructed and compacted by the Contractor as described above. Wherever possible, fords shall be constructed from rockfill or coarse material so as to limit, in so far as is possible, damage caused by flood waters. The Contractor shall construct cuttings where required.

PSMM 5.5.7 Gravelling of temporary deviations or of existing roads used as temporary deviations or haulage routes (New sub-clause)

Add new Sub-Clause:

When the earthworks for temporary deviations as described in Clause PSMM 5.5.6 have been completed, those sections of the temporary deviations, as indicated by the Employer's Agent, shall be provided with a wearing course of suitable gravel approved by the Employer's Agent.

The Contractor shall provide, spread, water, mix and compact such material to a density equal to 93% of modified AASHTO density.

If gravel shoulders are to be used for the accommodation of traffic and if the existing shoulders are unsafe for traffic, the shoulders shall be reconstructed as specified. All grass and couch grass shall be bladed from the surface. Approved gravel material shall be imported from the road reserve or from borrow pits. The materials shall be spread, watered, mixed and compacted to 93% of modified AASHTO density in layers of the specified thickness.

PSMM 5.5.8 Selected gravel layers, crushed stone or asphalt base, stabilisation, and road marking required for bitumen surfaced temporary deviations and haulage routes (New sub-clause)

Add new Sub-Clause:

Where specified in the project specifications or required by the Employer's Agent, gravel layers of selected subgrade or subbase quality, crushed-stone base, asphalt base or stabilized gravel layers shall be constructed and road marking shall be done by the Contractor, all in accordance with the requirements of the relevant sections of these specifications and the Employer's Agent's instructions.

PSMM 5.5.9 Bitumen surfaced temporary deviations and haulage routes (New sub clause)

Add new Sub-Clause:

Where required in the project specifications or by the Employer's Agent, temporary deviations shall be provided with bituminous surfacing in accordance with the requirements of SABS 1200MH or of the project specifications, or as may be prescribed by the Employer's Agent.

PSMM 5.5.10 Existing roads used as temporary deviations (New sub-clause)

Add new Sub-Clause:

Where existing roads are to be used as temporary deviations, the Contractor shall, after consultation with the owner or authority having control of such road, carry out any repairs, alterations or additions to such roads as may be required to bring them in a condition suitable for traffic. This work will be paid for as stipulated hereinafter.

PSMM 5.5.11 Existing roads used as haulage routes (New sub-clause)

Add new Sub-Clause:

Where existing roads are to be used as haulage routes, the Contractor shall, after consultation with the owner or authority having control of such road, carry out any repairs, alterations or additions to such roads as may be required to bring them in a condition suitable for traffic. This work will be paid for as stipulated hereinafter.

PSMM 5.5.12 Maintenance of gravel temporary deviations and existing gravel roads used as temporary deviations and haulage routes (New sub-clause)

Add new Sub-Clause:

All gravel temporary deviations and existing gravel roads used as temporary deviations shall be maintained by the Contractor in a safe trafficable condition. Whenever required by the Employer's Agent, the roads and temporary deviations shall be bladed by means of self-propelled road graders to provide a smooth riding surface free from corrugations. All potholes shall be repaired immediately.

The Employer's Agent may also instruct the Contractor to water the temporary deviations to keep down dust or to facilitate the proper blading of the surface. All drainage works shall be maintained in a good working order.

The blading of surfaces of temporary deviations and the application of gravel and water shall be measured and paid for separately, but all other maintenance shall be deemed to be included in the rate tendered for Clause PSMM 8.9.1: Accommodating traffic and maintaining temporary deviations.

PSMM 5.5.13 Maintenance of temporary deviations with bituminous surfacing and existing roads with bituminous surfacing used as temporary deviations or haulage routes (New sub-clause)

Add new Sub-Clause:

All roads with bituminous surfacing used by public traffic bypassing construction shall be maintained in a good and safe trafficable condition for the entire period during which such roads are used. Maintenance shall include the patching and repair of the bituminous surfacing, the clearing of shoulders, the clearing of all drains, including culvert inlet and outlet drains, and other incidentals and, unless otherwise specified in the project specifications, also the care and maintenance of all road markings, road signs, delineators and guardrails.

The cost of all maintenance to temporary deviations with bituminous surfacing shall be included in the rates tendered under Clause PSMM 8.9.1: Accommodating traffic and maintaining temporary deviations, except for the

cost of repairs to the bituminous surfacing and pavement, which shall be paid for separately under item PSMM 5.5.9.

PSMM 5.5.14 Accommodation of traffic where the road is constructed in half widths (New sub-clause)

Add new Sub-Clause:

Where, by reason of difficult terrain or for any other reason, the construction of temporary deviations is unfeasible, the Contractor shall, upon the written instruction of the Employer's Agent, construct the road in half widths to allow traffic to use that half of the road not under construction. The length of the half-width construction shall not exceed the length specified in the project specifications or on the drawings, or the length of the section of road that can be constructed and completed in one day, whichever is the shortest. Provision shall be made for traffic travelling in opposite directions to pass at frequent intervals.

The Contractor shall arrange his work so as to allow traffic to have free one-way access to at least half the width of the roadway at all times during the construction period. He shall maintain that half of the road, which is being used for traffic for the time being, in a trafficable condition, to the satisfaction of the Employer's Agent.

The length of work fronts on roads are to be limited in terms of Clause PS 5 of the Project Specification.

During the day the traffic shall be controlled by a STOP and RY/GO system.

Should the road be not in a safe trafficable condition for two-way traffic over the entire width at the end of each day's work, the Contractor shall provide adequate flagmen, signs, barricades, lights and the necessary staff at his own cost to ensure a reasonably free flow of traffic alternately in each direction throughout the entire period when the roadway is open to one-way traffic only.

PSMM 5.5.15 Temporary fencing and gates (New sub-clause)

Add new Sub-Clause:

Where ordered by the Employer's Agent or specified on the drawings or in the project specifications, the Contractor shall make his own arrangements for providing either new fencing and gates or moving and subsequently reinstating existing fencing and gates.

PSMM 5.5.16 The use of temporary deviations by the contractor (New sub-clause)

Add new Sub-Clause:

The Contractor shall have the right to use public roads, including temporary deviations open to public traffic, but where his own traffic causes excessive damage or wear to such roads or constitutes a condition hazardous to public traffic, the Employer's Agent shall have the right to regulate the Contractor's traffic over such temporary deviations and require the Contractor to provide, at his own cost, such maintenance, including wearing-course gravel and watering, as in the Employer's Agent's opinion will be necessary in addition to that which would be required to maintain the temporary deviations properly when not used by the Contractor's construction traffic.

PSMM 5.5.17 Obliteration of temporary deviations (New sub-clause)

Add new Sub-Clause:

When traffic is routed permanently onto the new road, and on the written instructions of the Employer's Agent, the Contractor shall obliterate the temporary deviations and designated sections of obsolete roads and road markings in accordance with section SABS 1200C

PSMM 5.5.18 Access ramps (New sub-clause)

Add new Sub-Clause:

Access Ramps for vehicles and pedestrians shall be placed across open excavated trenches, at all entrances to properties, where trench excavations obstruct access to these properties. Access Ramps shall be designed by a structural Employer's Agent to suit the circumstances of use which includes, but is not limited to: width of trench, loading requirements, stability of pipe trench or whichever design criteria are required or needs to be considered at any specific location.

Access Ramps shall be protected on each side by a stout two-rail timber fence, at least 1.2 m high, consisting of 150 mm x 75 mm timber verticals set firmly into the ground, with 75 mm x 50 mm rails securely fastened to them. At least 4 lamps and reflective markers must be provided at each crossing.

The load limitation of each ramp shall be clearly displayed and the Contractor shall ensure that this limit is in compliance with the required limit of the specific access. The Contractor shall take full responsibility for the adequacy of the Access Ramps.

Access Ramps shall be available at each and every work front for provision of access to properties.

Should access not be provided as a result of non availability of Access Ramps, excavation activities at the specific work front will be stopped until suitable Access Ramps are provided.

The tendered rates for the Access Ramps shall include for design, manufacture, placement, transportation, securing same to the ground, moving when required, provision of hand rails, lights and or any other aspect of the operation of the ramps that may be deemed required.

PSMM 8 MEASUREMENT AND PAYMENT

PSMM 8.2 SCHEDULED ITEMS FOR GUARDRAILS

PSMM 8.4 SCHEDULED ITEMS FOR ROAD MARKING

Amend clause PSMM 8.4.1 title as follows:

PSMM 8.4.1 Retro reflectorized paint applied as a nominal rate of 0.42P.m2

Amend the last paragraph of item 8.4.1 as follows:

The rate shall cover the cost of supplying all materials (including reflecting glass beads) and equipment necessary and for painting and protection (see 5.3.8), including the setting out of character, symbols and traffic islands marking and including the setting out and pre-marking of lines".

PSMM 8.4.3 Road studs

Add to Sub-Clause:

The type of road studs to be used shall be in terms of Clause PSMM 5.3.6.

PSMM 8.6 REMOVE EXISTING ROAD MARKINGS BY MEANS OF SAND BLASTING
UNIT: m²

Add new Sub-Clause:

The unit of measure shall be the square meter of actual road marking removed or obliterated by means of sandblasting.

The tendered rate shall include for all plant, labour, material, supervision and transportation costs, the necessary equipment, labour and materials, for any specific protection measures, accommodation of traffic and the clearing of the area of all dust, all as specified.

PSMM 8.7 ERECT TIMBER FENCING (POST AND RAIL) USING RECOVERED FENCING MATERIAL
UNIT: m

Add new Sub-Clause:

The unit of measure shall be the linear meter of timber fencing erected using recovered fencing material.

The rate shall include for the erection of timber fencing using recovered materials and includes all items and materials necessary to excavate holes, erect fencing, backfill postholes and dispose of surplus materials.

PSMM 8.8 SUPPLY AND ERECT TIMBER FENCING (POST AND RAIL) COMPLETE
UNIT: m

Add New Sub-Clause:

The unit of measure shall be the linear metre of timber fencing (post and rail) erected.

The rate shall cover the cost of supplying and erecting the timber fencing (post and rail) excavating and backfilling post holes as well as disposing of the surplus materials.

PSMM 8.9 ACCOMODATION OF TRAFFIC (NEW SUB-CLAUSE)

Add new Sub-Clause:

PSMM 8.9.1 Accommodating traffic and maintaining temporary deviations Unit: km

Add new Sub-Clause:

Unless otherwise stated, all costs including but not limited to the preparation and implementation of the Traffic Control Strategy, the supply and installation, maintenance and removal of all traffic control devices and temporary construction signing, the daily recording of temporary construction signing, the provision of flag persons, graveling, detour design, construction, dust abatement, maintenance, and removal, local road detour preparation, maintenance and restoration, dust abatement; and all labour, materials, equipment, tools, and incidentals necessary to complete the Work to the satisfaction of the Employer's Agent will be considered incidental to the

Work. The work shall be measured and paid for once only per kilometre for each type of traffic accommodation, in accordance with the TMP.

The tendered rate shall include full compensation for accommodating traffic and maintaining temporary deviations, including roads constructed in half-widths and existing roads used as temporary deviations during construction and maintenance periods, but excluding maintenance and repair work for which payment is specifically made under the other pay items provided. The tendered rate shall also include full compensation for the provision of communications equipment required for regulating the traffic, solving traffic problems and complying with the legal requirements of all authorities concerned.

The rate will be specified by type as per the Transportation Management Plan and the unit of measurement will be Kilometre for each type. The measurement will be rounded off to the nearest 0.1km at any given setup.

PSMM 8.9.2 Earthworks for temporary deviations

Unit: km

Add new Sub-Clause:

The unit of measurement shall be the kilometre of temporary deviations shaped, compacted and constructed in accordance with the provisions of PSMM 5.5.6 of this section. Where the Contractor has to provide access roads to private property, the length of such access roads outside the road reserve shall also be included in the quantity measured for payment.

The tendered rate shall include full compensation for clearing and grubbing where necessary, the removal of small trees and stumps, the shaping and grading, watering, mixing and compacting of the material and all cuts and fills constructed from material obtained from alongside the temporary deviations or side cut, but including only such portions of the fills which are less than 0,5m in height.

PSMM 8.9.3 Cut and borrow to fill

Unit: m3

Add new Sub-Clause:

The unit of measurement shall be the cubic metre of fill measured in situ from levelled cross-sections taken before and after construction where such material is either imported from a locality more than 100 m from the point of use or is utilized in a portion of a fill which is in excess of 0.5m above the original ground level.

Where measurement by cross-sections is impractical, the volume can be assumed to be equal to 70% of the loose volume measured in trucks in the case of soil and gravel material, and equal to 60% of the loose volume in trucks in the case of hard material consisting predominantly of particles of which the maximum dimension exceeds 100mm.

The tendered rate shall include full compensation for procuring, furnishing and the placing all the classes of material, including transporting over a free-haul distance of 1.0km.

PSMM 8.9.4 Cut to spoil

Unit: m3

Add new Sub-Clause:

The unit of measurement shall be the cubic metre of authorized excavation taken from cut in temporary deviations or removed from fill in temporary deviations which are no longer required and carted to spoil on the instructions of the Employer's Agent, all measured in situ before excavation by means of levelled cross-sections.

The tendered rate shall include full compensation for excavating in all classes of material, loading, transporting, offloading, including the shaping and levelling of spoil material and transporting over a free-haul distance of 1.0km.

PSMM 8.9.5 Blading by road grader of:

Add new Sub-Clause:

Temporary deviations Unit: km-pass

Existing gravel roads and shoulders used as temporary deviations Unit: km-pass

The unit of measurement for using a road grader to blade the surfaces of temporary deviations, existing roads and existing gravel shoulders used as temporary deviations shall be the kilometre-pass, that is, each kilometre of the full width of the temporary deviation, the entire surface of which has been bladed by one pass of the road grader. In the case of temporary deviations constructed as two separate one-way roads, they shall be considered as one full width of the temporary deviation for purposes of measurement.

Only the number of kilometre-passes actually authorised by the Employer's Agent, in writing, will be measured.

Where the blading of temporary deviations has not been carried out satisfactorily and the surface has not been improved as much as can reasonably be expected from such an operation, the Contractor shall carry out further grading work at his own expense until a satisfactory result is obtained.

The tendered rate shall include full compensation for providing the road graders and operators, flagmen, guards, barricades, signs and all other costs incidental thereto and for blading the temporary deviations to a smooth surface free from corrugations.

PSMM 8.9.6 Provision of access ramps

Add new Sub-Clause:

Access Ramps for trench width suitable for DN1600 pipe Unit: No

Access Ramps for trench width suitable for DN1400 pipe Unit: No

Access Ramps for trench width suitable for DN1200 pipe Unit: No

Access Ramps for trench width suitable for DN1000 pipe Unit: No

Access Ramps for trench width suitable for DN600 pipe Unit: No

Access Ramps for trench width suitable for DN500 pipe Unit: No

Access Ramps for trench width suitable for DN400 pipe Unit: No

Access Ramps for trench width suitable for DN300 pipe or smaller Unit: No

The tendered rates are deemed to include for the requirements as specified in PSMM 5.5.18.

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SANS 1921

The SANS 1921 Volumes 1, 2 and 6 - Construction and Management requirements for works standards and associated specification data are applicable.

Part 1 – General Employer's Agenting and construction works

Part 2 – Accommodation of traffic on public roads occupied by the contractor

Part 6 – HIV/AIDS awareness

The following amended specification data is applicable to this Contract:

Standard	Clause	Specification Data
SANS 1921-1		
		Essential/Additional/ Amended Data
	4.1.1 (o)	Amend data and add to clause as follows: Record Drawings (As built drawings) to be provided within 30 days of completion of each activity which allows updates of a particular drawing. All record drawings to be submitted as a requirement for Practical Completion certification.
	4.1.2 (b)	Add to sub clause: All wayleave applications will be done and provided by the employer
	4.1.6	Add to sub clause: All spoil shall be managed in terms of the requirements of the applicable environmental legislation and environmental specifications contained here in.
	4.1.8	Add to sub clause: The Contractor shall issue his construction programme to the Employer, in electronic format based on the latest version of MS Project. The Contractor shall refer to the programme clause contained in the Project Specification regarding the programme requirements
	4.1.11	Amend sub clause as follows: One hard copy only will provided
	4.2.1	The strategy in table 1 is "A".
	4.2.2	Amend sub clause as follows:

		“structural Employer’s Agent” shall read “the Employer’s Agent” or “the Employers Agent” depending on applicability of conditions of contract
	4.3	Add sub clause 4.3.4: Refer to section named – PS Construction Programme and add to existing
	4.3.3	Add to sub clause: The Contractor shall provide 24 hours notification.
	4.4	Add to sub clause: Refer to section named – PS Quality Assurance, and add requirements as stated.
	4.7	Add new sub clause 4.7.4: The Contractor shall comply with specification data as stated.
	4.8	Add to sub clause 4.8: The Contractor shall comply with the specification data as stated.
	4.10	Add sub clause 4.10.14: Earthworks and resultant spoil management shall comply with the requirements of the Environmental Management Plan
	4.11.1	Add to sub clause: Minimum testing sequences are specified in the Specification data. The Contractor shall execute more tests than those minimums specified where he deems such testing necessary for exercising adequate quality assurance and control in terms of his quality assurance plan.
	4.11.3	Add to sub clause: The Contractor is referred to additional requirements for records keeping and the presentation of the records. Refer to the requirement of a construction dossier for the Contract, section named Construction Dossier in the project specifications
	4.12.4	Add to sub clause: The Contractor shall ensure compliance with the Specification Data regarding the specific requirements for storage of materials, Plant and equipment.
	4.13.3	Add to sub clause:

		Compaction equipment shall be suitable for the areas to be compacted and no addition payment will be made for working in limited space conditions other than those rates provided for compaction, which are deemed to include for working under the relevant space conditions and constraints. The Contractor shall ensure that the compaction equipment shall not cause damage to existing infrastructure due to inappropriate use
	4.13.4.1	Replace sub clause as follows: The requirements of the specification data for concrete as stated under the amended specifications for concrete, PSG, are applicable.
	4.14.5	Add to sub clause: The Contractor shall provide ablution facilities for the exclusive use of the Employer's Agent and the Employer's Agent.
	4.15	Add sub clause 4.15.6: The Contractor shall be required to replace plot pegs which had to be removed/covered up as a result of construction activities. An item has been included in the Bill of Quantities for this purpose
	4.17	Add to sub clauses: Refer to section PS Protection of existing services and relocation of existing services for additional specification data.
	4.18.1	Add to sub clause: The Employer's health and safety specification and requirements are attached to the project specifications and should be complied with at all times.
	4.18.1	Add to sub clause: the amended standard specification as specified in the Project Specification for excavations are to be complied with.
	4.18.2	Add to sub clause: The specification data stated in terms of barricading and lighting is to be complied with
	4.18.3	Add to sub clause: The required legislative requirements for excavations are to be met at all times
	4.18.4	Add to existing sub clause: The requirements of the Environmental

		Management Plan are to be met at all times
	4.19	Add to sub clause: The requirements of the Environmental Management Plan are to be met at all times.
	SANS 1921-2	
		Essential/Additional/ Amended Data
		Add to SANS 1921-2: All the requirements of SABS 1200 PSMM as amended shall be met
	3.8	Add to sub clause: The definition of "road reserve" includes the informal road reserves as encountered in informal settlements
	4.2	Add to sub clauses: The requirements of the particular specifications are to be met
	4.2.5	Add to sub clause: the temporary deviation plan shall be submitted to the Employer's Agent for approval. (to be read as "the Employer's Agent" where applicable in terms of a specific conditions of contract
	4.5	Add to sub clause: All costs for the maintenance of the said temporary deviations and existing roads used as temporary deviations shall be deemed to have been included in the rates as reflected in the Bill of Quantities. All existing roads used as haul roads for construction purpose shall be maintained to an applicable standard and costs for this maintenance shall be deemed to have been included in the rates shown in the Bill of Quantities.
	4.5.3	Add new sub clause: the Contractor shall execute a photographic survey of roads to be utilised for construction purposes and the record shall be utilised to determine facts for decision making on acceptance of responsibility for maintenance purposes
	4.6.1	Add to sub clause: Half width road construction, where applicable shall be limited to 500m maximum length

	4.6.3	Amend sub clause as follows: The continuous length of road under construction shall be limited to 1000m
	4.6.4	Amend sub clause: the number of sections under construction shall not exceed 2 and spaces between sections, not being worked on shall not be less than 500m
	4.6.5	Add to sub clause: Where agreement is reached with the Employers Agent that road sections shall be closed 24hours a day, this has to comply with the requirements as stated in the Traffic/Transportation Management Plan and agreed to with the Employers Agent in writing
	4.9.2 (i)	Add new sub clause: The Contractor shall ensure that a Traffic safety Office is appointed for the work as defined in order to be able to comply with the requirements of traffic management and control during the execution of the Works. All rates for the execution of the Works are deemed to include for this overhead as and where required
	4.10	Add to sub clause: Temporary Traffic Control mechanisms are detailed under the section named PA – Temporary Traffic Control Mechanisms contained in the Traffic Management Plan or Transportation Management Plan.
	SANS 1921-6	
		Essential/Additional/Amended Data
	1 (e)	Add to sub clause: “Appointment of and HIV/AIDS Awareness Champion.
	4.2.1 (a)	Add to sub clause: A qualified service provider is a provider that appears on the list of recommended service providers, which is available from all regional offices of the Department of Public Works. The HIV/AIDS awareness programme shall be repeated at 6 monthly intervals for the duration of the Contract, including an initial programme at the commencement of the Contract.
	4.3.2	Add to sub clause:

		The HIV/Aids awareness champion and the Employer's Agent in this regard shall certify the report and schedule described in cl 4.3.1 whenever a claim for payment is issued to the Employer.

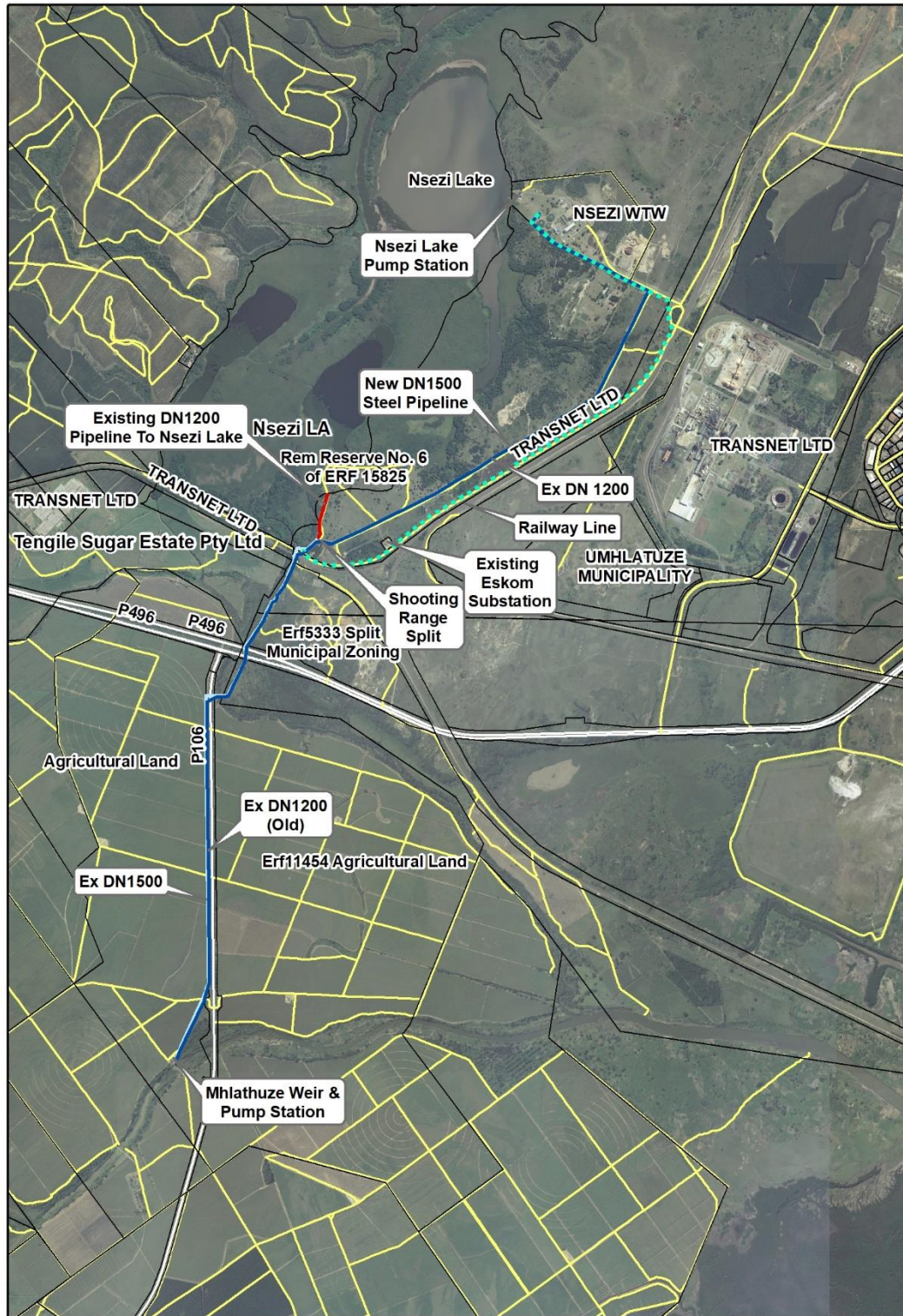
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PART C4

SITE INFORMATION

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C4.1 Locality



PART C5

PARTICULAR SPECIFICATIONS BOUND INTO DOCUMENT

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C 5.1 General Specifications

C5.1.1 EXISTING SERVICES

C5.1.1.1 Known Services

Known services in the area are shown on the layout plans and long sections. The information regarding existing services is given in good faith without guarantee.

The following authorities should be contacted by the Contractor to obtain additional information regarding services:

- | | | |
|----|-------------------|--|
| 1. | Electrical | Mhlathuze Water/City of Mhlathuze /Eskom |
| 2. | Storm water | Mhlathuze Water/City of Mhlathuze |
| 3. | Water Mains | Mhlathuze Water/City of Mhlathuze |
| 4. | Sewers | Mhlathuze Water/City of Mhlathuze |
| 5. | Roads | KZN Department of Transport/ Mhlathuze Water/City of Mhlathuze |
| 6. | Telephone |Telkom |
| 7. | Optic fibre cable | Neotel / Telkom / Mhlathuze Water/City of Mhlathuze |
| 8. | Rail lines | Spoortnet |

All known services in the area are indicated on the drawings and/or will be pointed out to the Contractor. There may be services which are unknown or have inadvertently been left out.

C5.1.2 FEATURES REQUIRING SPECIAL ATTENTION

C5.1.2.1 ACCESS TO PROPERTIES

The Contractor shall organize the work in such a manner as to cause the least possible inconvenience to the public and to the property owners. Written prior consent of the property owner shall be obtained from the property owner before accessing or commencing any activity on private land.

C5.1.2.2 PERMITS

The Contractor shall be responsible for obtaining all necessary permits to transport materials to the area.

No other special permits are envisaged, however, should any be necessary the Employer's Agent will timeously inform the Contractor. The Contractor shall then be responsible for obtaining the required permit(s), the cost of which shall be recoverable from the Employer.

C5.1.2.3 FACILITIES TO OTHER CONTRACTORS

The Contractor shall make allowance for the presence of other Contractors (sub-contractors) on Site, which may involve, inter alia, the adaptation of his programme to fit in with work to be done by the other Contractors, as well as assuring other Contractors access to the site. In particular the Contractors attention is drawn to the works which will need to be undertaken by his Sub-Contractor when installing the temporary (provisional) and final cathodic protection system.

C5.1.2.4 COURTESY

In all dealings with the public the Contractor shall bear in mind their right to enjoy the use of the roads and services and access to their properties and that the Employer desires to interfere as little as possible with these rights.

At all points of contact with the public, the Contractor and his staff are requested to handle discussions and disputes with deliberate courtesy and understanding. To assist the Contractor in his dealings with the public, use should be made by him of the Liaison Officer and the Employer's Agent's Representative on site. On occasions where the Contractor liaises directly with the public, the Liaison Officer and the Employer's Agent's Representative should be informed of the outcome to be able to maintain a coherent picture of developments in the area.

C5.1.2.5 DEALING WITH LANDOWNERS

It is of paramount importance that good relations be maintained at all times between the Contractor and the landowners and other stakeholders in the area. In order to preserve these good relations, the following routine shall be observed throughout the works:

(a) At least one week's notice shall be given by the Contractor to the Employer's Agent before entering upon any property for the purpose of commencing construction.

(b) On receipt of such notice, the Employer's Agent will, as far as possible, arrange for a meeting between the Employer's Agent, CLO, the Contractor and the landowner concerned during which the programme of construction will be discussed. The landowner/stakeholder will be advised of the times of commencement and completion of work on their land and will be acquainted with the Contractor's intentions with regard to the cutting down of trees, temporary lowering of fences, temporary access roads, and all other matters affecting the owners' land and farming operations.

(c) The Contractor shall negotiate directly with the landowners with regard to alternative access over private property to the site of the works; borrow pits and any dumping site for surplus excavation. All such sites shall be subject to the approval of the Employer's Agent and in accordance with the EMP, EMPr and the general re-vegetation specification. The Employer's Agent shall also be kept fully informed of all negotiations that are in progress between the Contractor and the landowners. The Contractor shall make prompt payment to the landowners for any royalties for borrow pits and for any agreed amounts to be paid to the farmer for the use of borrow pits, dumping sites, access roads, etc. No separate payment shall be made to cover royalties and all costs in this regard shall be deemed to be included in the tendered rates.

Any requests from owner / stakeholders which are reasonable and which will not affect the economical construction of the works in accordance with the Specification shall be met if at all possible.

The Contractor shall, within a period of 3 months of completing the construction work on any private property produce to the Employer's Agent a certificate, signed by the landowner in question, that all the Contractor's obligations to the landowner have been completely discharged in terms of the prior agreement between the Contractor and landowner.

If such evidence is not produced within the stipulated period, the Employer reserves the right to investigate any agreement entered into between the landowner in question and the Contractor and any claims made by the landowner. If the Employer is then satisfied that the Contractor is in default in terms of the contract and any private agreements made, all justifiable claims shall be paid to the landowner by the Employer from retention money held and shall be deducted from the amount payable to the Contractor.

It is noted that where appropriate, servitudes and or wayleaves will be arranged by the Employer. It is unlikely that these agreements will be in place prior to the commencement of construction activities and the Contractor is accordingly advised to maintain cordial relations with landowners at all times.

C5.1.2.6 WORKING WITHIN THE ROAD RESERVE AND LANDOWNERS' PROPERTY

Sections of the Site will be through private agricultural land (sugar cane fields)

The Contractor will be responsible for any damage to crops, fencing, structures, etc. caused by his activities on Site. The Contractor must obtain permission from land owners where necessary, for the removal of fences and must erect temporary fences or gates in these openings during the construction period. The permanent fencing must be replaced as soon as possible and must comply with at least the original product. It is essential that the least inconvenience to private property be caused during the construction period.

All such sites shall be left in the same condition as they were found initially, on completion of the construction work.

The Contractor shall observe the following when operating within private property, roads and road reserve:

- (a) The Employer will acquire the necessary permanent and temporary working and access servitudes from the owners of all properties crossed by the pipeline, or has permission to occupy where the servitudes will not be obtained. A public meeting for all the Interested and Affected Parties (I&AP's), including all landowners, has been held but the Contractor may be required to attend further meetings from time to time.
- (b) At all times the Contractor shall confine his operations to the area of the servitude and within the fenced working strip width agreed by the Employer unless he has made prior arrangements with adjoining land owners to the Employer's Agent's approval.
- (c) No damage shall be done to buildings, dwellings, crops, cultivated lands, dams, watercourses, roads, fences and the like outside the servitude.
- (d) When working within existing road reserves the Contractor shall ensure that as little inconvenience as possible is caused to residents and traffic. Extra care shall be taken with regard to the siting of the excavated material and pipes so that disturbances will be minimized.
- (e) The area within the road reserves and pipeline servitudes shall be restored to the same standard and state as it was before construction at the Contractor's expense.
- (f) Every precaution must be taken by the Contractor to prevent any flooding and erosion damage to adjoining property resulting from uncontrolled run-off during construction.
- (g) The contractor shall provide all necessary signage and traffic control personnel to ensure the safety of workmen and the safe passage of traffic when working in or adjacent to roads.
- (h) The contractor shall comply with the Department of Transports specifications and conditions when working in their road reserve and the cost thereof is deemed to be included in the contractor's rates.

C5.1.3 ABNORMAL CLIMATIC CONDITIONS

The Contractor shall record all climatic conditions during the execution of the Works. The recordings shall be submitted to the Employer's Agent's Representative on a weekly basis-

No extension of time for completion shall be granted for normal rainfall (i.e. "Normal climatic conditions" shall not be deemed to constitute "circumstance of any kind" in terms of Sub-clause 5.12.1 of GCC 2015.). The formula below shall be used to calculate the delay for each calendar month separately within the contractual period. The final determination of the total extension of time for the contract shall be the aggregate of the monthly delays. Only when the Works shall have been completed in terms of Sub-clause 5.14.3 of GCC 2015 shall the extension of time for completion resulting from climatic conditions, if any, be finalized by the Employer's Agent.

$$V_n = \frac{(N_w - N_n) + (R_w - R_n)}{X}$$

$$V = \sum(V_n)$$

The symbols have the following meanings respectively:

V = Total extension of time for the contract due to abnormal climatic conditions.

V_n = Extension of time in calendar days in respect of the calendar month under consideration.

N_w = Actual number of days during the calendar month on which a rainfall of 10mm or more is recorded.

N_n = Average number of days, as derived from existing rainfall records, on which a rainfall of 10mm or more has been recorded for the calendar month.

R_w = Actual rainfall recorded for the calendar month (in millimetres).

R_n = Average rainfall for the calendar month under consideration as determined from existing rainfall records (in millimetres).

$X = 20\text{mm}$

When calculating the extension of time for a part of a month (such as over the shut-down period) pro rata values of R_n and N_n shall be used.

If any value of V_n is negative and its absolute value exceeds N_n , then V_n shall be taken as equal to minus N_n .

If the grand total extension of time (V) is negative, the time for completion shall not be reduced on account of abnormal rainfall.

The total extension of time for any calendar month (V_n) shall not exceed $(N_n - N_c)$ days, where N_c = number of days in the month under consideration.

The factor $(N_w - N_n)$ shall be deemed to be a fair allowance for variation from the average number of days during which rainfall equals or exceeds 10mm per day, as given in the table below.

The factor $(R_w - R_n) \div X$ shall be considered to represent a fair allowance for variations from the average for the number of days during which rainfall does not equal or exceed 10mm per day, but when wet conditions prevent or disrupt work.

This formula does not consider any flood damage, which could cause further or concurrent delays and which should be treated separately in so far as extension of time is concerned. (note clause in this specification, "Dealing with water")

The following are the most reliable values of Nn and Rn available and shall be used unless other values are mutually **agreed upon beforehand**:

Rainfall Station : **Richard's Bay Rainfall Station**

Month	Nn	Rn
January	3.5	172
February	4.0	167
March	3.2	107
April	3.1	109
May	2.3	109
June	1.6	57
July	1.6	60
August	1.8	65
September	2.5	77
October	3.4	105
November	3.3	114
December	2.7	86
Total	33	1228

The rain data shall be recorded via a digital wireless, solar-powered weather station such as the *Vantage Vue Wireless Weather Station*, *AcuRite 5 in 1 Weather Station*, or similar approved with minimum requirements as given below:

- Self-emptying rain sensor
- Data recording at 60 second intervals or less
- USB/Wireless PC backup
- Solar powered with backup battery (or wired with 48 hours+ backup battery)

The weather station shall be mounted in an open area at a height of 2.5m, unaffected by surrounding trees or buildings. The contractor shall be responsible for monitoring the battery and power to the weather station, where/if required.

The weather station shall be paid for by the contract and is considered the property of UUW and shall be handed to UUW at the end of the contract.

Daily rainfall data shall be downloaded and backed-up on at least a weekly basis and checked and signed off by the Employer's Agent's Representative. As a control measure, a standard rain gauge shall be installed adjacent to the digital rain gauge, read daily at 8am, and recorded in the daily site diary. This control gauge will purely serve the purpose of a providing an indicative reading prior to the data downloads, or to be utilized in the event of a failure of the digital gauge.

The downloaded and signed off data, will be presented, and recorded at monthly progress meetings. At the following monthly meeting, the preceding months data will be agreed to.

Should an extension of time be granted by the Employer's Agent the Contractor shall be reimbursed for his **time related Preliminary and General items contained in the schedule of Quantities only**.

C5.1.4 USE OF PROPRIETARY NAMES

The use of proprietary names in no way indicates preference for a particular product. Rather, this usage is to illustrate to the tenderer the type and nature of product sought. Equipment with similar materials of constructions, similar functionality and no material deviation from the product used for illustrative purposes will be deemed to be “similar approved”.

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C 5.2 Particular Specification

SDPDA QUALITY CONTROL & QUALITY ASSURANCE SYSTEM (SPEC PDA)

SDPDA 3 QUALITY PLAN

SDPDA 3.6* Quality Assurance System

The Contractor shall institute a Quality Assurance System to demonstrate compliance with the requirements of the Contract. The Employer's Agent shall be entitled to audit any aspect of the system.

Details of all procedures and compliance documents shall be submitted to the Employer's Agent for information before each design (if specified) and execution stage is commenced. When any document of a technical nature is issued to the Employer's Agent, evidence of the prior approval by the Contractor himself shall be apparent on the document itself.

The Contractor shall:

- (i) supply a Quality Plan and Quality Program at the time of tendering, both of which are subject to acceptance by the Employer's Agent,
- (ii) maintain quality Control records in accordance with the Quality Plan during execution of the contract. Such records shall be available to the Employer's Agent or his representative at each Quality Surveillance visit,
- (iii) mark or securely label each component with a unique identification; and
- (iv) carry out such tests as are required to ensure compliance with the Specification.

Compliance with the Quality Assurance System shall not relieve the Contractor of any of his duties, obligations or responsibilities under the Contract.

Any approval, check, certificate, consent, examination, inspection, instruction, notice, observation, proposal, request, test or similar act by the Employer's Agent (including absence of disapproval) shall not relieve the Contractor from any responsibility he has under the Contract, including responsibility for errors, omissions, discrepancies and non-compliances.

Failure to comply with these requirements shall be just cause for the Employer's Agent to order suspension of the Works without additional remuneration, or for him (Employer's Agent) to recommend termination of the contract to the Employer in terms of the Conditions of Contract.

The Contractor shall supply all items with a guarantee valid for a period of 12 months after final acceptance of the items after installation of such items on site by the installation contractor.

SDPDA 3.7* Independent Inspectorate

The Contractor may nominate an independent inspectorate, to be approved by the Employer's Agent, which approval shall not be unreasonably withheld, to carry out any tests to verify compliance with the corrosion protection specifications on behalf of the Contractor. The independent inspectorate shall not be employed by, or associated in any way with, the person or firm applying the corrosion protection systems.

The inspectorate shall inspect the work to verify that at least the following are in accordance with the specifications :

- i) Preparation of steel prior to welding,
- ii) Welding and jointing,
- iii) Surface preparation prior to painting and/or galvanizing,
- iv) Coating thickness,
- v) Holiday testing, and
- vi) Paint quality, type and method of application,
- vii) Compaction densities.

The Contractor shall :

- i) Draw up a quality control programme together with the inspectorate, showing appropriate "hold-points" which the Employer's Agent may elect to witness,
- ii) Contact the inspectorate timeously to make arrangements for him to inspect the various items to be tested both prior to and after surface preparation, painting or galvanizing,
- iii) Submit copies of the quality control program to the Employer's Agent for approval before proceeding with any surface preparation or coating or galvanizing, and
- iv) Submit all the inspectorate's reports to the Employer's Agent.

SDPDA 4 MEASUREMENT AND PAYMENT

SDPDA 4.2* Cost of Independent Inspectorate

The Contractor shall be liable for all costs incurred and fees charged by the independent inspectorate appointed by him. The tendered rates for items shall cover the costs thereof and no separate payment will be made in this regard.

SDPDA 4.3* Corrosion Protection and Painting

The cost of the corrosion protection and painting shall be included in the tendered rate for an item. No separate payment shall be made for corrosion protection and painting.

PAM: OHSA1993 HEALTH AND SAFETY SPECIFICATION

PAM-1: SCOPE

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

This specification shall be read with the Occupational Health and Safety Act (Act No 85 and amendment Act No 181) 1993, and the corresponding Construction Regulations 2014, and all other safety codes and specifications referred to in the said Construction Regulations.

In terms of the OHSA Agreement in Section 9 (Forms to be Completed by Successful Tenderer) of the tender document, the status of the Contractor as mandatory to the Employer (client) is that of an employer in his own right, responsible to comply with all provisions of OHSA 1993 and the Construction Regulations 2014.

This safety specification and the Contractor's own Safety Plan as well as the Construction Regulations 2014, shall be displayed on site or made available for inspection by all workers, employees, inspectors and any other persons entering the site of works.

PAM-2: DEFINITIONS

For the purpose of this contract the following shall apply:

- (a) "Employer" where used in the contract documents and in this specification, means the Employer as defined in the General Conditions of Contract and it shall have the exact same meaning as "client" as defined in the Construction Regulations 2014. "Employer" and "client" is therefore interchangeable and shall be read in the context of the relevant document.
- (b) "Contractor", wherever used in the contract documents and in this specification, shall have the same meaning as "Contractor" as defined in the General Conditions of Contract. In this specification the terms "principal contractor" and "contractor" are replaced with "Contractor" and "subcontractor" respectively.

For the purpose of this contract the Contractor will, in terms of OHSA 1993, be the mandatory, without derogating from his status as an employer in his own right.

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

PAM-3: TENDERS

The Contractor shall submit the following with his tender:

- (a) a documented Health and Safety Plan as stipulated in Regulation 5 of the Construction Regulations. The Safety Plan must be based on the Construction Regulations 2014 and will be subject to approval by the Employer;
- (b) a declaration to the effect that he has the competence and necessary resources to carry out the work safely in compliance with the Construction Regulations 2014;

- (c) a declaration to the effect that he made provision in his tender for the cost of the health and safety measures envisaged in the Construction Regulations.
- (d) Failure to submit the foregoing with his tender, will lead to the conclusion that the Contractor will not be able to carry out the work under the contract safely in accordance with the Construction Regulations.

PAM-4: NOTIFICATION OF COMMENCEMENT OF CONSTRUCTION WORK

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

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

The notification must be done in the form of the pro forma included under Section 9 (Forms to be Completed by Successful Tenderer) of the tender document.

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

PAM-5: RISK ASSESSMENT

Before commencement of any construction work during the construction period, the Contractor shall have a risk assessment performed and recorded in writing by a competent person.

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

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

PAM-6: APPOINTMENT OF EMPLOYEES AND SUBCONTRACTORS

PAM-6.1 Health and Safety Plan

The Contractor shall appoint his employees and any subcontractors to be employed on the contract, in writing, and he shall provide them with a copy of his documented Health and Safety Plan, or relevant sections thereof. The Contractor shall ensure that all subcontractors and employees are committed to the implementation of his Safety Plan.

PAM-6.2 Health and Safety Induction Training

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

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

PAM-7: APPOINTMENT OF SAFETY PERSONNEL

PAM-7.1: Construction Supervisor

The Contractor shall appoint a full-time Construction Supervisor with the duty of supervising the performance of the construction work.

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

PAM-7.2: Construction Safety Officer

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

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

PAM-7.3: Health and Safety Representatives

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

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

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

PAM-7.4: Health and Safety Committee

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

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

PAM-7.5: Competent Persons

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

- Risk assessment and induction training as described in Regulation 7 of the Construction Regulations;
- Fall protection as described in Regulation 8;
- Formwork and support work as described in Regulation 10;
- Demolition work as described in Regulation 12;
- Scaffolding work as described in Regulation 14;
- Suspended platform operations as described in Regulation 15;
- Batch plant operations as described in Regulation 18;
- Construction vehicle and mobile plant inspections on a daily basis by a competent person as described in Regulation 21(1);
- Control of all temporary electrical installations on the construction site as described in Regulation 22.
- Stacking and storage on construction sites as described in Regulation 26; and
- Inspections of fire equipment as described in Regulation 27.

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

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

PAM-8: RECORDS AND REGISTERS

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

1. A copy of the OHSA 1993 Construction Regulations 2014;
2. A copy of this Health and Safety Specification;
3. A copy of the Contractor's Health and Safety Plan (Regulation 4);
4. A copy of the Notification of Construction Work (Regulation 3);
5. A health and safety file in terms of Regulation 5(7) with inputs by the Construction Safety Officer [Regulation 6(7)];
6. A copy of the risk assessment described in Regulation 7;
7. A full protection plan and the corresponding records of evaluation and training of employees working from elevated positions as described in Regulation 8;
8. Drawings pertaining to the design of structures [Regulation 9(3)] and formwork and support work structures [Regulation 10(d)] must be kept on site;
9. Pronouncement of the safety of excavations must be recorded in a register to be kept on site [Regulation 11(3)(h)];
10. A copy of the certificate of the system design for suspended platforms [Regulation 15(3)];

11. A notice must be affixed around the base towers of material hoists to indicate the maximum mass load, which may be carried at any one time by material hoists [Regulation 7(5)].
12. Maintenance records of material hoists and inspection results must be kept in a record book to be kept on site [Regulation 17(8)];
13. A record of any repairs to or maintenance of a batch plant must be kept on site [Regulation 18(9)];
14. A warning notice must be displayed in a conspicuous manner when and wherever an explosive powered tool is used [Regulation 19(2)];
15. A register for recording of findings by the competent person appointed to inspect construction vehicles and mobile plant [Regulation 21(1)(j)].

PAM-9: CONTRACTOR'S RESPONSIBILITIES

For this contract the Contractor will be the mandatory of the Employer (Client), as defined in the Act (OHSA 1993), which means that the Contractor has the status of employer in his own right in respect of the contract. The Contractor is therefore responsible for all the duties and obligations of an employer as set out in the Act (OHSA 1993) and the Construction Regulations 2014.

Before commencement of work under the contract, the Contractor shall enter into an agreement with the Employer (Client) to confirm his status as mandatory (employer) for the contract under consideration.

The Contractor's duties and responsibilities are clearly set out in the Construction Regulations 2014, and are not repeated in detail but some important aspects are highlighted hereafter, without relieving the Contractor of any of his duties and responsibilities in terms of the Construction Regulations.

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

In accordance with Section 4 of the Regulations, the Contractor shall liaise closely with the Employer or the Employer's Agent on behalf of the Employer, to ensure that all requirements of the Act and the Regulations are met and complied with.

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

The Contractor is in terms of the definition in Regulation 2(b) the equivalent of Principal Contractor as defined in the Construction Regulations, and he shall comply with all the provisions of Regulation 5.

Any subcontractors employed by the Contractor must be appointed in writing, setting out the terms of the appointment in respect of health and safety. An independent subcontractor shall however provide and demonstrate to the Contractor a suitable, acceptable and sufficiently documented health and safety plan before commencement of the subcontract. In the absence of such a health and safety plan the subcontractor shall undertake in writing that he will comply with the Contractor's safety plan, the health and safety specifications of the Employer and the Construction Regulations 2014.

(c) Supervision of construction work (Regulation 6)

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

(d) Risk assessment (Regulation 7)

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

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

(e) Fall protection (Regulation 8)

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

(f) Structures (Regulation 9)

The Contractor will be liable for all claims arising from collapse or failure of structures if he failed to comply with all the specifications, project specifications and drawings related to the

structures, unless it can be proved that such collapse or failure can be attributed to faulty design or insufficient design standards on which the specifications and the drawings are based.

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

(g) Formwork and support work (Regulation 10)

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

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

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

(h) Excavation work (Regulation 11)

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

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

(i) Demolition work (Regulation 12)

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

(j) Tunnelling (Regulation 13)

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

(k) Scaffolding (Regulation 14)

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

(l) Suspended platforms (Regulation 15)

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

(m) Boatswain's chairs (Regulation 16)

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

(n) Material Hoists (Regulation 17)

Wherever applicable, the Contractor shall comply with the provisions of Regulation 17 to the letter.

(o) Batch plants (Regulation 18)

Wherever applicable, the Contractor shall ensure that all lifting machines, lifting tackle, conveyors, etc. used in the operation of a batch plant shall comply with, and that all operators, supervisors and employees are strictly held to the provisions of Regulation 18.

The Contractor shall ensure that the General Safety Regulations (Government Notice R1031 of 30 May 1986), the Driven Machinery Regulations (*Government Notice R295 of 26/2/1988*) and the Electrical Installation Regulations (*Government Notice R2271 of 11/10/1995*) are adhered to by all involved.

In terms of the Regulations, records of repairs and maintenance shall be kept on site.

(p) Explosive powered tools (Regulation 19)

The Contractor shall ensure that, wherever explosive-powered tools are required to be used, all safety provisions of Regulation 19 are complied with.

It is especially important that warning notices are displayed and that the issue and return of cartridges and spent cartridges be recorded in a register to be kept on site.

(q) Cranes (Regulation 20)

Wherever the use of tower cranes becomes necessary, the provisions of Regulation 20 shall be complied with.

(r) Construction vehicles and mobile plant (Regulation 21)

The Contractor shall ensure that all construction vehicles and plant are in good working condition and safe for use, and that they are used in accordance with their design and intended use. The vehicles and plant shall only be operated by workers or operators who have received appropriate training, all in accordance with all the requirements of Regulation 21.

All vehicles and plant must be inspected on a daily basis, prior to use, by a competent person and the findings must be recorded in a register to be kept on site.

(s) Electrical installation and machinery on construction sites (Regulation 22)

The Contractor shall comply with the Electrical Installation Regulations (Government Notice R2920 of 23 October 1992) and the Electrical Machinery Regulations (Government Notice R1953 of 12 August 1993). Before commencement of construction, the Contractor shall take adequate steps to ascertain the presence of, and guard against dangers and hazards due to electrical cables and apparatus under, over or on the site.

All temporary electrical installations on the site shall be under the control of a competent person, without relieving the Contractor of his responsibility for the health and safety of all workers and persons on site in terms of Regulation 22.

(t) Use of temporary storage of flammable liquids on construction sites (Regulation 23)

The Contractor shall comply with the provisions of the General Safety Regulations (*Government Notice R1031 of 30 May 1986*) and all the provisions of Regulation 23 of the Construction Regulations to ensure a safe and hazard-free environment to all workers and other persons on site.

(u) Water environments (Regulation 24)

Where construction work is done over or in close proximity to water, the provisions of Regulation 24 shall apply.

(v) Housekeeping on Construction sites (Regulation 25)

Housekeeping on all construction sites shall be in accordance with the provisions of the environmental Regulations for workplaces (*Government Notice R2281 of 16 October 1987*) and all the provisions of Regulation 25 of the Construction Regulations.

(w) Stacking and storage on construction sites (Regulation 26)

The provisions for the stacking of articles contained in the General Safety Regulations (*Government Notice R1031 of 30 May 1986*) as well as all the provisions of Regulation 26 of the Construction Regulations shall apply.

(x) Fire precautions on construction sites (Regulation 27)

The provisions of the Environmental Regulations for Workplaces (*Government Notice R2281 of 16 October 1987*) shall apply.

In addition the necessary precautions shall be taken to prevent the incidence of fires, to provide adequate and sufficient fire protection equipment, sirens, escape routes etc. all in accordance with Regulation 27 of the Construction Regulations.

(y) Construction welfare facilities (Regulation 28)

The Contractor shall comply with the construction site provisions as in the Facilities Regulations (*Government Notice R1593 of 12 August 1988*) and the provisions of Regulation 28 of the Construction Regulations.

(z) Non-compliance with the Construction Regulations 2014

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

PAM-10: MEASUREMENT AND PAYMENT

PAM-10.1: Principles

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

(a) Safety personnel

The Construction Supervisor, the Construction Safety Officer, Health and Safety Representatives, Health and Safety Committee and Competent Persons referred to in clauses PAM-7.1 to 7.5 shall be members of the Contractor's personnel, and no additional payment will be made for the appointment of such safety personnel.

However, should it be necessary to appoint a dedicated Construction Safety Officer in terms of Clause PAM-7.2 on the instruction of the Inspector of the Department of Labour, as ordered by the Employer's Agent, payment will be considered for such appointment.

(b) Records and Registers.

The keeping of health and safety-related records and registers as described in PAM-8 is regarded as a normal duty of the Contractor for which no additional payment will be considered, and which is deemed to be included in the Contractor's tendered rates and prices.

PAM-10.2: Scheduled Items

PAM-10.2.1 Appointment of a Construction Health and Safety Officer Unit: As per BoQ

The stated provisional sum shall be employed to cover the cost for the appointment of a full-time or part-time dedicated Construction Health and Safety Officer as directed by an Inspector of the Department of Labour, and as ordered by the Employer's Agent.

Should the Construction Health and Safety Officer be selected from the Contractor's own personnel, payment will only be considered for proven additional cost claimed by the Contractor due to the additional duties of the appointee.

- END OF SECTION -

**PARTICULAR SPECIFICATION PEM:
MANAGEMENT SPECIFICATION**

ENVIRONMENTAL

A) DEFINITIONS

For the purposes of this Specification the definitions and abbreviations given in the applicable specifications listed in 2.1 and the following definitions shall apply:

Environment means the surroundings within which humans exist and that are made up of –

- i) the land, water and atmosphere of the earth;
- ii) micro-organisms, plant and animal life;
- iii) any part or combination of i) and ii) and the interrelationships among and between them; and
- iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Potentially hazardous substance is a substance that, in the reasonable opinion of the Employer's Agent, can have a deleterious effect on the environment.

Method Statement: a written submission by the Contractor to the Employer's Agent in response to the Specification or a request by the Employer's Agent, setting out the plant, materials, labour and method the Contractor proposes using to carry out an activity, identified by the relevant specification or the Employer's Agent when requesting the Method Statement, in such detail that the Employer's Agent is enabled to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications.

The Method Statement shall cover applicable details with regard to:

- construction procedures,
- materials and equipment to be used,
- getting the equipment to and from site,
- how the equipment/ material will be moved while on site,
- how and where material will be stored,
- the containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur,
- timing and location of activities,
- compliance/ non-compliance with the Specifications and
- any other information deemed necessary by the Employer's Agent.

Reasonable means, unless the context indicates otherwise, reasonable in the opinion of the Employer's Agent after he has consulted with a person, not an employee of the Employer, suitably experienced in "environmental implementation plans" and "environmental management plans" (both as defined in Act No 107,1998).

Solid waste means all solid waste, including construction debris, chemical waste, excess cement/ concrete, wrapping materials, timber, tins and cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).

Contract means the General Conditions of Contract and Special Conditions, Specifications, Drawings, Tender, written records of matters agreed after the submission of the Contractor's tender, Letter of Acceptance and

Agreement, together with other documents which the parties have agreed in writing shall form part of the Contract and such amendments or additions to the Contract as may be agreed in writing between the parties.

Contaminated water means water contaminated by the Contractor's activities, e.g. concrete water and runoff from plant/ personnel wash areas.

B) MATERIALS

Materials Handling, Use and Storage

The Contractor shall ensure that any delivery drivers are informed of all procedures and restrictions (including "no go" areas) required to comply with the Specifications. The Contractor shall ensure that these delivery drivers are supervised during off loading, by someone with an adequate understanding of the requirements of the Specifications.

Materials shall be appropriately secured to ensure safe passage between destinations. Loads including, but not limited to sand, fine vegetation, refuse, paper and cement, shall have appropriate cover to prevent them spilling from the vehicle during transit. The Contractor shall be responsible for any clean-up resulting from the failure by his employees or suppliers to properly secure transported materials.

All manufactured and/ or imported material shall be stored within the Contractor's camp, and, if so required by the Project Specification, out of the rain. All lay down areas outside of the construction camp shall be subject to the Employer's Agent's approval, which shall not unreasonably be withheld.

Hazardous Substances

Hazardous chemical substances (as defined in the Regulations for Hazardous Chemical Substances) used during construction shall be stored in secondary containers. The relevant Material Safety Data Sheets (MSDS) shall be available on Site. Procedures detailed in the MSDS's shall be followed in the event of an emergency situation.

Hazardous and non-hazardous materials shall be separated at site and disposed of in a manner approved by the Employer's Agent.

Sludge is regarded as a hazardous substance and shall be disposed of at a hazardous waste disposal site approved by the Employer's Agent. The sludge shall not be dried using existing or other sludge drying beds, but shall transfer directly to the hazardous waste disposal site. The Contractor shall supply the Employer's Agent with a certificate of disposal for all disposed sludge.

The trucks transporting the sludge shall be watertight, and the Contractor shall take all reasonable measures to ensure that no sludge is deposited on any public roads during its transfer to the waste disposal site. In the event of a spillage occurring, the Contractor shall clean it up to the satisfaction of the Employer's Agent and the relevant Local Authorities.

C) CONSTRUCTION

Method Statements

Any Method Statement required by the Employer's Agent or the Project Specification shall be produced within such reasonable time as the Employer's Agent shall specify or as required by the Project Specification. The Contractor shall not commence the activity until the Method Statement has been approved and shall, except in the case of emergency activities, allow a period of two weeks for approval of the Method Statement by the Employer's Agent. Such approval shall not unreasonably be withheld.

The Employer's Agent may require changes to a Method Statement if the proposal does not comply with the specification or if, in the reasonable opinion of the Employer's Agent, the proposal may result in, or carries a greater than reasonable risk of, damage to the environment in excess of that permitted by the Specifications.

Approved Method Statements shall be readily available on the site and shall be communicated to all relevant personnel. The Contractor shall carry out the Works in accordance with the approved Method Statement.

Approval of the Method Statement shall not absolve the Contractor from any of his obligations or responsibilities in terms of the Contract.

Site Division

The Contractor shall restrict all his activities, materials, equipment and personnel to within the designated areas as specified by the Employer's Agent.

Site Structures

All site establishment components (as well as equipment) shall be positioned to limit visual intrusion on neighbours and the size of area disturbed. The type and colour of roofing and cladding materials to the Contractor's temporary structures shall be selected to reduce reflection.

Security

The contractor's camp areas shall be fenced with a minimum 1.8 metre high secure fence for the duration of the construction period.

Security guards shall control access to camp areas and to vehicular access routes to the construction site at all times during the construction phase.

Fences shall be checked regularly for breaches and be repaired as necessary.

Strict stock control systems shall be enforced in storage areas, particularly where chemicals, explosives and other potentially dangerous materials are being stored. Checking of stock quantities shall be undertaken immediately prior to contract progress meetings and findings shall be reported at the meetings.

Transportation of Labour

Labour should be transported to and from the site in vehicles, where possible, arranged by the Contractor to discourage loitering in adjacent areas and possible increase in crime or disturbance. Unsocial activities such as unauthorised consumption or illegal selling of alcohol on the site shall be banned and any persons found to be engaged in such activities shall be removed from site for the duration of the contract and may have criminal action taken against them.

Informal Settlements

No labour other than essential personnel required for stand-by situations and security shall be housed on the site. Measures shall be put in place, in consultation with the local authority, to prevent squatting on the site and in areas immediately adjacent to the site.

Lighting

The placement of light sources within the construction site and camp areas must be carefully planned so as to avoid causing a nuisance to residents.

Eating Areas

The Contractor shall designate an eating area for his employees. The Contractor shall provide bins with lids in this area. The waste may be temporarily stored on Site in a central waste area that is weatherproof and scavenger-proof, and which the Employer's Agent has approved.

Any cooking on Site shall be done on well-maintained gas cookers with fire extinguishers present.

Ablution Facilities

Washing, whether of the person or of personal effects and acts of excretion and urination are strictly prohibited other than at the facilities provided.

The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are properly stored and removed from Site. Discharge of waste from toilets into the environment or works, and burial of waste is strictly prohibited.

Lights

The Contractor shall ensure that any lighting installed on the site for his activities does not interfere with road traffic or cause a reasonably avoidable disturbance to the surrounding community or other users of the area.

"No go" Areas

If so required by the Project Specification, certain areas shall be "no go" areas. The Contractor shall ensure that, insofar as he has the authority, no person, machinery, equipment or material enters the "no go" areas at any time.

Solid Waste Management

No on-site burying or dumping of any waste materials, vegetation, litter or refuse shall occur. The Contractor shall provide sufficient bins with lids on Site to store the solid waste produced on a daily basis. Bins shall not be allowed to become overfull and shall be emptied a minimum of once daily. The waste may be temporarily stored on Site in a central waste area that is weatherproof and scavenger-proof, and which the Employer's Agent has approved.

All solid waste shall be disposed of off site at an approved landfill site. The Contractor shall supply the Employer's Agent with a certificate of disposal.

Emergency Procedures

The Contractor's procedures for the following emergencies shall include:

i) Fire

The Contractor shall advise the relevant authority of a fire as soon as one starts and shall not wait until he can no longer control it. The Contractor shall ensure that his employees are aware of the procedure to be followed in the event of a fire.

ii) Accidental leaks and spillages

The Contractor shall ensure that his employees are aware of the procedure to be followed for dealing with spills and leaks, which shall include notifying the Employer's Agent and the relevant authorities. The Contractor shall ensure that the necessary materials and equipment for dealing with spills and leaks is available on Site at all times. Treatment and remediation of the spill areas shall be undertaken to the reasonable satisfaction of the Employer's Agent.

In the event of a hydrocarbon spill, the source of the spillage shall be isolated, and the spillage contained. The area shall be cordoned off and secured. The Contractor shall ensure that there is always a supply of absorbent material readily available to absorb/ breakdown and where possible be designed to encapsulate minor hydrocarbon spillage. The quantity of such materials shall be able to handle a minimum of 200 l of hydrocarbon liquid spill.

Fire Control

No fires may be lit on site. Any fires that occur shall be reported to the Employer's Agent immediately. Smoking shall not be permitted in those areas where it is a fire hazard. Such areas shall include the workshop and fuel storage areas and any areas where the vegetation or other material is such as to make liable the rapid spread of an initial flame. In terms of the Atmospheric Pollution Prevention Act (No. 45 of 1965), burning is not permitted as a disposal method.

The Contractor shall appoint a Fire Officer who shall be responsible for ensuring immediate and appropriate actions in the event of a fire and shall ensure that employees are aware of the procedure to be followed. The Contractor shall forward the name of the Fire Officer to the Employer's Agent for his approval.

The Contractor shall ensure that there is basic fire-fighting equipment available on Site at all times. This shall include at least rubber beaters and at least one fire extinguisher of the appropriate type when welding or other "hot" activities are undertaken.

Noise

The Contractor shall limit noise levels (e.g. install and maintain silencers on machinery). The provisions of SABS 1200A Subclause 4.1 regarding "built-up areas" shall apply to all areas within audible distance of residents whether in urban, peri-urban or rural areas.

Appropriate directional and intensity settings are to be maintained on all hooters and sirens. No amplified music shall be allowed on Site. The use of radios, tape recorders, compact disc players, television sets etc shall not be permitted unless the volume is kept sufficiently low as to avoid any intrusion on members of the public within range. The Contractor shall not use sound amplification equipment on Site unless in emergency situations.

Construction activities generating output levels of 85 dB (A) or more, in residential areas, shall be confined to the hour's 08h00 to 17h00 Mondays to Fridays.

Blasting, pneumatic rock drills or other noisy activities should take place during normal working hours. The community should be notified prior to any planned activities that will be unusually noisy. These activities could include, but are not limited to, blasting and the use of pneumatic rock drills.

Noise suppression measures must be applied to all construction equipment. Construction equipment must be kept in good working order, and where appropriate fitted with silencers which are to be kept in good working order. Should the vehicles or equipment not be in good working order, the Contractor may be instructed to remove the offending vehicle or machinery from site.

Should complaints regarding noise levels be received, as a result of construction activities on the site, these shall be recorded by the ELO, and if the associated operation is programmed to occur over an extended period of longer than two days, then the offending machinery or vehicle shall be identified and remedial measures implemented.

The Contractor shall take measures to discourage labourers from loitering in the area and causing noise disturbance. Where possible labour shall be transported to and from the site by the Contractor or his Sub Contractors by the Contractors own transport.

Access Routes/ Haul Roads

On the Site, and, if so required by the Project Specification, within such distance of the Site as may be stated, the Contractor shall control the movement of all vehicles and plant including that of his suppliers so that they remain on designated routes, are distributed so as not to cause an undue concentration of traffic and that all relevant laws are complied with. In addition such vehicles and plant shall be so routed and operated as to minimise disruption to regular users of the routes not on the Site. On gravel or earth roads on Site and within 500m of the Site, the vehicles of the Contractor and his suppliers shall not exceed a speed of 45 km/hr.

Safety

Telephone numbers of emergency services, including the local firefighting service, shall be posted conspicuously in the Contractor's office near the telephone.

No unauthorised firearms are permitted on Site.

Protection of Natural Features

The Contractor shall not deface, paint, damage or mark any natural features (e.g. rock formations) situated in or around the Site for survey or other purposes unless agreed beforehand with the Employer's Agent. Any features affected by the Contractor in contravention of this clause shall be restored/ rehabilitated to the satisfaction of the Employer's Agent.

Within 500m of the Site the Contractor shall not permit his employees to make use of any natural water sources (e.g. springs, streams, open water bodies) for the purposes of swimming, personal washing and the washing of machinery or clothes.

Protection of Flora and Fauna

Except to the extent necessary for the carrying out of the Works, flora shall not be removed, damaged or disturbed nor shall any vegetation be planted without authorisation.

Trapping, poisoning and/ or shooting of animals is strictly prohibited. No domestic pets or livestock are permitted on Site.

Where the use of herbicides, pesticides and other poisonous substances has been specified, they shall be stored, handled and applied with due regard to their potential harmful effects.

The Contractor will follow previously mentioned management guidelines Section 3.1.4 regarding the avoidance of soil degradation.

Construction and delivery vehicles shall only use established roads when transporting items to/from site.

The contractor shall be limited to a maximum working corridor of 5 metres wide through areas of crop, grassland and areas of indigenous vegetation.

The Employer's Agent may instruct that any ecologically valuable plant species, found on site and likely to be disturbed by construction operations shall be removed by suitably qualified personnel (horticulturist) to a location within the alignment area to be instructed by the Employer's Agent.

No plants or animals will be allowed to be caught, collected and consumed on site or removed from site by the Contractor or his personnel or sub-contractors. Any individual caught collecting plant or animal species shall be removed from the site for the duration of the contract and criminal proceedings may be pursued. The Main Contractor shall be held responsible for all infringements of this condition and a penalty of R1000.00 shall be charged for each infringement. An infringement shall be deemed to have occurred for each trap found, each person caught hunting, each animal caught and each plant harvested.

Fires and collection of firewood will not be permitted on or adjacent to site.

Sanitation and Ablution Facilities

Adequate sanitation and ablution facilities must be provided for construction workers to avoid the use of the open space and water courses as toilets or washing facilities. Toilets and ablution facilities shall be connected to the municipal sewer, as far as possible. Chemical latrines, if used, shall be emptied regularly by a responsible contractor with knowledge of proper sanitation disposal procedures.

In addition, food preparation areas shall be provided with adequate washing facilities and food refuse shall be stored in sealed refuse bins which shall be removed from site at least twice weekly, to prevent the attraction of vermin.

The Contractor shall take steps to ensure that littering by construction workers does not occur and persons shall be employed on the site to collect litter from the site and immediate surroundings.

Skip waste containers shall be maintained on site. These shall be kept covered and arrangements made for them to be collected regularly from site by an appropriate contractor.

Storage of Materials

The Contractor will maintain storage of all potentially polluting materials, and shall undertake potentially polluting operations as far away as practically possible from areas of indigenous vegetation, topsoil/subsoil stockpiles and watercourses. The Contractor will ensure that additional supervisory time is spent to monitor such works. Such materials/operations include (but are not limited to):

- batching, storing of cement, concrete and mortar;
- petrol, oil and chemical storage and transfer;
- washing, ablution and toilet facilities;
- plant storage

All oils and lubricants which are unopened shall be stored in the workshop store on site. Used oils/lubricants will be put into drums and recycled. The Main Contractor will be responsible for ensuring that these used oils/lubricants are not disposed of by dumping pouring on open ground or down drains or in water courses. The main contractor shall ensure that contractors purchasing these materials understand the liability under which they must operate. The Environmental Liaison Officer will be responsible for reporting the storage/use of any other potentially harmful materials to DWAF.

The Environmental Liaison Officer will be responsible for ensuring that potentially harmful materials are properly stored in a dry, secure environment, with concrete or sealed flooring and a means of preventing unauthorized entry. The Environmental Liaison Officer will further ensure that materials storage facilities are cleaned/maintained on a regular basis, and that leaking containers are disposed of in a manner which allows no spillage onto the bare soil. The management of such storage facilities and means of securing them shall be agreed.

No washing of construction vehicles and plant will be allowed on site other than wheel washing. No detergents or chemicals will be used for wheel washing.

Machinery and plant shall keep as far away from watercourses as possible. No washing of vehicles/ plant in natural watercourses shall be allowed.

Aesthetics

The Contractor shall take reasonable measures to ensure that construction activities do not have an unreasonable impact on the aesthetics of the area.

Community Relations

If so required by the Project Specification, the Contractor shall erect and maintain information boards in the position, quantity, design and dimensions specified. Such boards shall include contact details for complaints by members of the public in accordance with details provided by the Employer's Agent.

The Contractor shall keep a "Complaints Register" on Site. The Register shall contain all contact details of the person who made the complaint, and information regarding the complaint itself.

Unskilled and semi-skilled labour should be recruited from the local communities. Recruitment will take place through formal procurement procedure that includes a positive policy towards the employment of members of previously disadvantaged communities.

Where appropriate, the contractor will undertake training of unskilled and semi-skilled labour.

Where appropriate, labour intensive construction methods should be utilised to maximise the potential number of employment opportunities.

No selling or consuming of alcohol shall be permitted on site and any person found importing alcohol, drugs or illegal substances, shall be removed from the site for the duration of the contract and criminal action may be taken.

Loss of Crop Plants

A photographic record of the existing crop plants that will be affected by the works should be compiled. Compensation rates with the crop owners should be negotiated and the agreed compensation paid to the owners.

Cultural Environment

Compliance with KwaZulu-Natal Heritage Act

Any possible archaeological / historical finds uncovered during construction must be brought to the attention of and investigated by a qualified archaeologist. Such finds must be reported to the Employer's Agent who shall instruct work in the area of the find to be stopped immediately and shall report the find to the nearest Amafa KwaZulu Natal office and to the Natal Museum to comply with the KwaZulu-Natal Heritage Act of 1997 (Section 27).

The Contractor shall ensure that his workforce are aware of the necessity of reporting any possible historical or archaeological finds to the ELO so that the appropriate action can be taken. The contractor should be aware that failure to comply with this condition could lead to legal action being taken against him.

Temporary site closure

If the Site is closed for a period exceeding one week, the Contractor in consultation with the Employer's Agent shall carry out the checklist procedure required by the Project Specification.

D) PLANT

Fuel (petrol and diesel) and Oil

Fuel may be stored on site and the fuel storage area shall be located at the workshop or a fuel storage depot located within the construction camp. The Contractor shall ensure that all liquid fuels (petrol and diesel) are stored in tanks with lids, which are kept firmly shut or in bowzers. The tanks/ bowzers shall be situated on a smooth impermeable surface (plastic or concrete) base with an earth bund (plastic must have sand on top to prevent damage and perishing). The impermeable lining shall extend to the crest of the bund and the volume inside the bund shall be 110% of the total capacity of all the storage tanks/ bowzers. The bunded area shall be covered.

Only empty and externally clean tanks may be stored on the bare ground. All empty and externally dirty tanks shall be stored on an area where the ground has been protected. If fuel is dispensed from 200 litre drums, the proper dispensing equipment shall be used, and the drum shall not be tipped in order to dispense fuel. The dispensing mechanism of the fuel storage tank shall be stored in a waterproof container when not in use.

The Contractor shall prevent unauthorised access into the fuel storage area. No smoking shall be allowed within the vicinity of the fuel storage area. The Contractor shall ensure that there is adequate fire-fighting equipment at the fuel stores.

Where reasonably practical, plant shall be refuelled at the depot or at the workshop as applicable. If it is not reasonably practical then the surface under the refuelling area shall be protected against pollution to the reasonable satisfaction of the Employer's Agent prior to any refuelling activities. The Contractor shall ensure that there is always a supply of absorbent material readily available to absorb/breakdown and where possible be designed to encapsulate minor hydrocarbon spillage. The quantity of such materials shall be able to handle a minimum of 200 l of hydrocarbon liquid spill. This material must be approved by the Employer's Agent prior to any refuelling or maintenance activities.

Contaminated Water

The Contractor shall set up a contaminated water management system, which shall include collection facilities to be used to prevent pollution, as well as suitable methods of disposal of contaminated water.

The Contractor shall prevent discharge water contaminated with any pollutants, such as cements, concrete, lime, chemicals and fuels, into the works or into any drainage line, stream, river or other wetland. The Contractor shall not discharge the water used in cleaning the equipment into the works.

The Employer's Agent's approval will be required prior to the discharge of contaminated water to a Municipal sewer system.

The Contractor shall notify the Employer's Agent immediately of any pollution incidents on Site.

Grout Batching Area

Grout shall be mixed in the proper plant. All cement-contaminated water resulting from batching of grout shall be disposed of via the wastewater management system, and shall not be discharged into the river.

Workshop, Equipment Maintenance and Storage

Where practical, all maintenance of equipment and vehicles on Site shall be performed in the workshop. If it is necessary to do maintenance outside of the workshop area, the Contractor shall obtain the approval of the Employer's Agent prior to commencing activities.

The Contractor shall ensure that in his workshop and other plant maintenance facilities, including those areas where, after obtaining the Employer's Agent's approval, the Contractor carries out emergency plant maintenance, there is no contamination of the soil or vegetation. The workshop shall have a smooth impermeable (concrete or thick plastic covered with sand) floor. The floor shall be bunded and sloped towards an oil trap or sump to contain any spillages of substances (e.g. oil). When servicing equipment, drip trays shall be used to collect the waste oil and other lubricants. Drip trays shall also be provided in construction areas for stationary plant (such as compressors) and for "parked" plant (such as scrapers, loaders, vehicles).

All vehicles and equipment shall be kept in good working order and serviced regularly. Leaking equipment shall be repaired immediately or removed from the Site. When servicing or refuelling equipment, drip trays shall be used to collect the waste oil and other lubricants.

The washing of equipment shall be restricted to urgent or preventative maintenance requirements only. All washing shall be undertaken in the workshop or maintenance areas, and these areas must be equipped with a suitable impermeable floor and sump/oil trap. The use of detergents for washing shall be restricted to low phosphate and nitrate containing, low sudsing-type detergents.

Dust

The Contractor shall take all reasonable measures to minimise the generation of dust as a result of construction activities to the satisfaction of the Employer's Agent. Appropriate dust suppression measures, e.g. dampening with water, shall be used when dust generation is unavoidable, particularly during prolonged periods of dry weather in summer.

During high wind conditions, the Contractor shall comply with the Employer's Agent instructions regarding dust-dampening measures. The Employer's Agent may request the temporary cessation of all construction activities where wind speeds are unacceptably high, and until such time as wind speeds return to acceptable levels.

The Contractor will dampen all exposed soil surfaces including; access roads, works areas and camp areas with a water bowser or sprinklers, as necessary to minimise dust problems. Mitigation will be especially significant during extended dry periods or due to particular operations such as soil stripping, blasting or excavation at which times damping down shall take place on a continual basis.

The Contractor will commence rehabilitation of exposed soil surfaces as soon as practical after completion of earthworks. This includes the grassing of any cut and fill soil slopes immediately on completion of earthworks.

The regular maintenance of plant and machinery will be undertaken to ensure that gaseous emissions are minimised. The Contractor shall ensure that his Sub Contractors comply with this condition. Any offending machinery or plant may be instructed to be removed from site.

Cooking will only be permitted in designated areas by approved vendors. Only gas operated cookers will be permitted. All food preparation areas shall be operated to hygienic standards and shall be regularly inspected by the Environmental Liaison Officer.

The Contractor must further ensure that any grass or weed vegetation left in a natural state and adjacent to cooking areas shall be cut to prevent fires, especially during the dry months.

Blasting shall be carried out in accordance with legislation using optimal and not excessive quantities of explosives. The manufacturers recommended mitigation measures shall be applied, such as blankets and watering down of surfaces. Blasting shall only occur on calm days. All explosive material, if retained on site, shall be stored in a secure and separately designated area. If any rock removal is found to be necessary within 500 metres of any existing buildings, alternative methods of rock removal shall be considered.

Existing vegetation will assist in screening the site, control dust and help prevent soil erosion.

Areas of indigenous vegetation shall be fenced off during construction as instructed by the Employer's Agent.

All existing vegetation on and adjacent to the pipe alignment shall be retained.

Should it become necessary to undertake bush clearance, all areas of clearance and removal of individual trees shall only be undertaken after approval by the Employer's Agent, who shall inspect the area of proposed clearance with the ECO. Should the contractor not comply with this condition a penalty of R1000.00 shall be imposed on him for each area of shrub / herbaceous vegetation or each individual tree removed without approval. The contractor shall also be responsible for immediate rehabilitation of the area affected to the satisfaction of the Employer's Agent and at his own cost.

E) FINES FOR NON COMPLIANCE WITH THIS ENVIRONMENTAL MANAGEMENT PLAN.

Fines will be issued for the transgressions listed below. Fines may be issued per incident at the discretion of the Employer's Agent. Such fines will be issued in addition to any remedial costs incurred as a result of non-compliance with the environmental specifications. The Employer's Agent will inform the Contractor of the contravention and the amount of the fine, and will deduct the amount from monies due under the Contract.

Fines for the activities detailed below, will be imposed by the Employer's Agent on the Contractor and/or his Sub-contractors.

- | | | |
|----|--|---------|
| a. | Any employee's, vehicles, plant, or thing related to the Contractors operations operating within the designated boundaries of a "no-go" area. | R 5 000 |
| b. | Any vehicle driving in excess of designated speed limits. | R 1 000 |
| c. | Employees walking, any vehicle being driven, and items of plant or materials being parked or stored outside the demarcated boundaries of the site. | R 2 000 |

d.	Persistent and un-repaired oil leaks from machinery.	R 3 000
e.	Persistent failure to monitor and empty drip trays timeously.	R 1 000
f.	Persistent spillage of sludge on public roads due to the Contractors negligence.	R 5 000
g.	The use of inappropriate methods for refuelling.	R 1 000
h.	Litter on site associated with construction activities.	R 1 000
i.	Deliberate lighting of illegal fires on site.	R 5 000
j.	Any employee eating meals on site, outside of the defined eating area.	R 1 000
k.	Employees not making use of the site ablution facilities.	R 1 000
l.	Failure to implement specified noise controls.	R 1 000
m.	Failure to empty waste bins on a regular basis.	R 1 000
n.	Inadequate dust control.	R 3 000
o.	A spillage, pollution, fire or any damage to on site flora or any wetland River resulting from negligence on the part of the Contractor.	R 10 000
p.	The use of inappropriate handling and disposal methods for the sludge and effluent.	R 5 000
q.	An individual littering on the site	R 20
r.	An individual making an illegal fire on site	R 20 - 200
s.	An individual using a funnel for refuelling rather than a pump	R 20
t.	An individual performing an ablution anywhere other than in a toilet	R 20
u.	An individual eating a meal outside of the defined eating area	R 20

For each subsequent similar offence the fine shall be doubled in value to a maximum value of R30,000.

The Employer's Agent shall be the judge as to what constitutes a transgression in terms of this clause, subject to the provisions of Clause 60(1) of the General Conditions of Contract. In the event that transgressions continue the Contractors attention is drawn to the provisions of Sub-clause 58(1)(b)(vi) of the General Conditions of Contract under which the Employer's Agent may cancel the Contract.

F) ENVIRONMENTAL MANAGEMENT COMPLIANCE

Environmental Officers

The Contractor shall appoint an Environmental Liaison Officer (ELO) for the duration of the construction period. The ELO shall be a senior member of the construction team and have overall environmental management responsibilities on the site.

The ELO is to monitor the activities of the Main Contractor and any subcontractors, and is to ensure that mitigation measures contained in this document are adhered to. The ELO is to liaise with the Environmental Control Officer (ECO) on a regular basis so as to inform the ECO of the adherence to and effectiveness of the prescribed management measures. The ECO shall be appointed by Mhlathuze Water. Any new, or amendments to existing, mitigation measures to address areas of concern notified by the ECO are to be acted on as necessary by the Contractor.

Mhlathuze Water will be responsible for maintaining communication channels with I&APs throughout the Construction Phase. A record of all correspondence with I&APs should be kept by Mhlathuze Water noting the date, details of the I&AP, details of correspondence, details of any issues discussed and details of any follow-

up action taken. All communications with I&APs received by the ECO, ELO or other members of the environmental management team shall be referred to Mhlathuze Water to ensure that these are properly recorded and the appropriate action taken.

EMP Compliance Monitoring and Audits

The Environmental Liaison Officer will conduct regular monitoring of the Construction Phase to ensure compliance with this EMP and keep records of such monitoring. The results of this monitoring will be reported to the Contractor, Mhlathuze Water and the ECO in the form of a compliance monitoring report which must be submitted monthly during the Construction Phase. The ELO shall also keep records of non-compliance and how this was rectified, and this must be reported to the Contractor, Mhlathuze Water, the ECO and the Environmental Committee in order that they can follow up if necessary.

Environmental Audits will be undertaken by the ECO and the ELO on a monthly basis during the Construction Phase and annually during the Operation Phase. The results of these audits will be included in EMP Compliance Reports to be submitted to the Department of Agriculture and Environmental Affairs (DAEA). DAEA, through their Inspectorate will also be involved in monitoring procedures as necessary.

EMP Compliance

The EMP will be considered an extension of the Conditions of Approval as set forth by DAEA. Non-compliance with the EMP will constitute non-compliance with said Conditions.

The EMP will be made binding on all contractors operating on the site and will be included within the Contractual Clauses. According to the DAEA Standard Conditions for EIA Approval, non-compliance with, or any deviation from, the conditions set out in the document constitutes a failure in compliance with the approval. Such failure in compliance will be dealt with in terms of Sections 29, 30, and 31 of the Environment Conservation Act (Act No. 73 of 1989), as well as any other appropriate legal mechanisms.

It should be noted that in terms of the Environment Conservation Act, those responsible for Environmental Damage (in this case the Contractor) must pay the repair costs both to the environment and human health and the preventative measures to reduce or prevent further pollution and / or environmental damage (The polluter pays principle).

Tolerances

Environmental management is concerned not only with the final results of the Contractor's operations to carry out the Works but also with the control of how those operations are carried out. Tolerance with respect to environmental matters applies not only to the finished product but also to the standard of the day-to-day operations required to complete the Works.

It is thus required that the Contractor shall comply with the environmental requirements on an ongoing basis and any failure on his part to do so will entitle the Employer's Agent to certify the imposition of a fine subject to the conditions in the Pro Forma: Protection of the Environment and the details set out in the Project Specification.

ENVIRONMENTAL PROTECTION DECLARATION

Employer: Mhlathuze Water
Contract No:

PROTECTION OF THE ENVIRONMENT

The Contractor will not be given right of access to the Site until this form has been signed

I/ we,.....{Contractor} record as follows:

1. I/ we, the undersigned, do hereby declare that I/ we am/ are aware of the increasing requirement by society that construction activities shall be carried out with due regard to their impact on the environment.
2. In view of this requirement of society and a corresponding requirement by the Employer with regard to this Contract, I/ we will, in addition to complying with the letter of the terms of the Contract dealing with protection of the environment, also take into consideration the spirit of such requirements and will, in selecting appropriate employees, plant, materials and methods of construction, in-so-far as I/ we have the choice, include in the analysis not only the technical and economic (both financial and with regard to time) aspects but also the impact on the environment of the options. In this regard, I/ we recognised and accept the need to a Tender by the "precautionary principle" which aims to ensure the protection of the environment by the adoption of the most environmentally sensitive construction approach in the face of uncertainty with regard to the environmental implications of construction.
3. I/ we acknowledge and accept the right of the Employer to deduct, should he so wish, from any amounts due to me/ us, such amounts (hereinafter referred to as fines) as the Employer's Agent shall certify as being warranted in view of my/ our failure to comply with the terms of the Contract dealing with protection of the environment, subject to the following:
 - 3.1 The Employer's Agent may impose such fine only –
 - 3.1.1 if he is reasonably satisfied of my/ our failure to comply with the terms of the Contract dealing with protection of the environment
 - 3.1.2 if he is reasonably satisfied that it is necessary to impose such fine in order to achieve future compliance
 - 3.1.3 after he has consulted with a person suitably experienced in "environmental implementation plans" and "environmental management plans" (both as defined in Act No 107,1998) as to whether there has been a failure to comply with a terms of the Contract dealing with protection of the environment and as to a reasonable amount of the fine.
 - 3.2 The Employer's Agent, in determining the amount of such fine, shall take into account *inter alia*, the nature of the offence, the seriousness of its impact on the environment, the degree of prior compliance/non-compliance, the extent of the Contractor's overall compliance with environmental protection requirements and, in particular, the extent to which he considers it necessary to impose a sanction in order to eliminate/reduce future occurrences

- 3.3 The Employer's Agent shall, with respect to any fine imposed, provide me/ us with a written statement giving details of the offence, the facts on which the Employer's Agent has based his assessment and the terms of the Contract (by reference to the specific clause) which has been contravened.
- 3.4 At the sole discretion of the Employer's Agent, the Employer's Agent may at any time before one month after the issue of the Certificate of Completion (for the last completed portion of the Works should there be more than one), reverse all or some, in whole or in part, of previously imposed fine and shall include such reversed payment in a subsequent Payment Certificate.
- 3.5 The sum total of all fines retained by the Employer after the processing of any Payment Certificate issued up to one month after the issue of the Certificate of Completion referred to above, shall, within one month be paid by the Employer to a charity mutually agreed upon by the Contractor and the Employer, failing which agreement, as determined by the Employer's Agent following consultation with the two parties.

Signed
CONTRACTOR

Date.....

Witnesses:

.....
.....

PCVD: COVID 19 HEALTH & SAFETY SPECIFICATION
PCVD 1 GENERAL

Coronavirus disease 2019 (COVID-19) is defined as illness caused by a novel coronavirus now called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2; formerly called 2019-nCoV), which was first identified amid an outbreak of respiratory illness cases in Wuhan City, Hubei Province, China. [1] It was initially reported to the WHO on December 31, 2019. On January 30, 2020, the WHO declared the COVID-19 outbreak a global health emergency. [2, 3] On March 11, 2020, the WHO declared COVID-19 a global pandemic, its first such designation since declaring H1N1 influenza a pandemic in 2009.

With reference to the Regulations for Hazardous biological Agents and the Directive: COVID-19 OCCUPATIONAL HEALTH AND SAFETY MEASURES IN WORKPLACES COVID-19 (C19 OHS), 2020 The Principal Contractor and all Contractors shall implement the following precautionary measures to prevent the spread of Covid 19.

PCVD 1.1 The steps taken to get the workplace Covid-19 ready

- Taking into account the specific circumstances of the workplace the Principal Contractors and Contractors shall undertake a risk assessment to give effect to the minimum measures specified by Directive: COVID-19 OCCUPATIONAL HEALTH AND SAFETY MEASURES IN WORKPLACES COVID-19 (C19 OHS), 2020
- Principal Contractors and Contractors shall notify all workers of the contents of this Workplace plan and the manner in which we intend to implement it.
- Principal Contractors and Contractors shall notify their employees that if they are sick or have symptoms associated with the COVID-19 that they must not come to work and to take paid sick leave in terms of section 22 of the BCEA.
- Principal Contractors and Contractors shall appoint a manager to address employee or workplace representative concerns and to keep them informed.
- Principal Contractors and Contractors shall ensure that the measures required by this workplace plan and our risk assessment plan are strictly complied with through monitoring and supervision; Contractors shall implement a detailed monitoring plan.
- Principal Contractors and Contractors shall minimize the number of workers on at the workplace at any given time through rotation, staggered working hours, shift systems and remote working arrangements in order to achieve social distancing.
- Principal Contractors and Contractors shall take measures to minimize contact between workers as well as between workers and members of the public.
- Principal Contractors and Contractors shall provide workers with information that raises awareness in any form or manner, including where reasonably practicable leaflets and notices placed in conspicuous places in the workplace informing our workers of the dangers of the virus, the manner of its transmission, the measures to prevent transmission such as personal hygiene, social distancing, use of masks, cough etiquette and where to go for screening or testing if presenting with the symptoms.

PCVD 1.2 Workplace plan

The Principal Contractor and each Contractor shall complete and submit a detailed Workplace plan to the appointed OHS Agent for approval. The work place plan shall include the following information:

- Purpose of the plan
- Scope of the plan
- Definitions
- Date the Principal Contractor plans to reopen the site.
- Time Table: Setting out phase return to work. (How will the Principal Contractor and Contractors minimize the number of workers on at the workplace at any given time through rotation, staggered working hours, shift systems and remote working arrangements in order to achieve social distancing.)
- Steps to get workplace Covid 19 ready.
 - Symptoms screening.
 - Sanitizers, disinfectants and other measures.
 - Cloth masks.
 - Ventilation.
- List of staff that can work from home.
- Arrangements for staff in the establishments
 - Sanitary and social distancing measures and facilities at the entrance and exit of the workplace.
 - Screening facilities and systems
 - The attendance record system and infrastructure
 - The work areas of employees
 - Any designated area where the public is served
 - Canteen and bathroom facilities
 - Testing facilities (for establishments with more than 500 employees)
 - Staff rotational arrangements (for establishments where fewer than 100% of employees will be permitted to work)
- Arrangements for customers or members of the public, including sanitation and social distancing measures.

PCVD 1.3 Covid 19 Risk Assessment

The Principal Contractor and all Contractors shall undertake a risk assessment to give effect to the minimum measures specified by Directive: COVID-19 OCCUPATIONAL HEALTH AND SAFETY MEASURES IN WORKPLACES COVID-19 (C19 OHS), 2020

The risk management process shall include:

- Risk assessment review register
- Covid 19 Risk Assessment
- Covid 19 Safe operating procedure
- Covid 19 Monitoring plan

The Risk Assessment shall be reviewed once:

- A person tests positive for Covid 19 on site
- Any changes in legal and other requirements

- If any controls proposed on the risk assessment failed

PCVD 1.4 Symptom screening.

The Principal Contractor and all Contractors shall:

- Screen any worker, at the time that they report for work, to ascertain whether they have any of the observable symptoms associated with COVID-19, namely fever, cough, sore throat, redness of eyes or shortness of breath (or difficulty in breathing).
- Require every worker to report whether they suffer from any of the following additional symptoms: body aches, loss of smell or loss of taste, nausea, vomiting, diarrhea, fatigue, weakness or tiredness; and
- Require workers to immediately inform the Principal Contractor if they experience any of the symptoms listed above.
- If a worker presents with those symptoms, or advises us of these symptoms, the Principal Contractor shall –
 - Not permit the worker to enter the workplace or report for work or
 - If the worker is already at work immediately-
 - Isolate the worker, arrange for the worker to be transported in a manner that does not place other workers or members of the public at risk either to be self-isolated or for a medical examination or testing; and assess the risk of transmission, disinfect the area and the worker's workstation, refer those workers who may be at risk for screening.
 - Ensure that the worker is tested or referred to an identified testing site.
- The Contractor shall place the employee on paid sick leave in terms of section 22 of the BCEA or if the employee's sick leave entitlement under the section is exhausted, make application for an illness benefit in terms of clause 4 of the Directive issued on 25 March 2020 on the COVID-19 Temporary Employer Relief Scheme under regulation 10(8) of the Regulations promulgated in terms of section 27(2) of the Disaster Management Act;
- Contractors shall ensure that the employee is not discriminated against on grounds of having tested positive for COVID-19 in terms of section 6 of the Employment Equity Act, 1998 (Act No. 55 of 1998).
- If there is evidence that the worker contracted COVID-19 as a result of occupational exposure the Contractors shall lodge a claim for compensation in terms of the Compensation for Occupational Injuries and Diseases Act, 1993 (Act No. 130 of 1993) in accordance with Notice 193 published on 3 March 2020
- If a worker has been diagnosed with COVID-19 and isolated in accordance with the Department of Health Guidelines, a worker will only be allowed to return to work on the following conditions:
 - The worker has undergone a medical evaluation confirming that the worker has been tested negative for COVID-19.
 - Contractors shall ensure that personal hygiene, wearing of masks, social distancing, and cough etiquette is strictly adhered to by the worker; and that we closely monitor the worker for symptoms on return to work.

PCVD 1.5 Sanitizers, disinfectants and other measures.

The hand sanitizer used by Contractors shall have at least 70% alcohol content and is in accordance with the recommendations of the Department of Health.

The Principal Contractor and all Contractors shall, free of charge, ensure that –

- There are sufficient quantities of hand sanitizer based on the number of workers or other persons who access the workplace at the entrance of, and in, the workplace which the workers or other persons are required to use.
- Provide every employee who works away from the workplace, other than at home, with an adequate supply of hand sanitizer.
- If a worker interacts with the public, Contractors shall provide the worker with sufficient supplies of hand-sanitizer at that worker's workstation for both the worker and the person with whom the worker is interacting with.
- Shall ensure that all work surfaces, equipment and tools are disinfected before work begins, regularly during the working period (at least every 4 hours) and after work ends.
- Shall ensure that all areas such as toilets, common areas, door handles, shared electronic equipment, tools and other equipment are regularly cleaned and disinfected.
- Shall ensure that there are adequate facilities for the washing of hands with soap and clean water;
- Only paper towels shall be provided to dry hands after washing – the use of fabric toweling is prohibited;
- The workers are required to wash their hands and sanitize their hands regularly while at work;
- Workers interacting with the public are instructed to sanitize their hands between each interaction with public.
- Shall ensure surfaces that workers and members of the public come into contact with are routinely cleaned and disinfected.

PCVD 1.6 Cloth masks.

The Principal Contractor and all Contractors shall:

- Provide each of our employees, free of charge, with a minimum of two cloth masks, a face shield which comply with the requirement set out in the Guidelines issued by the Department of Trade, Industry and Competition,⁸ for the employee to wear while at work and while commuting to and from work; and require any other worker to wear masks in the workplace.
- Shall inform, instruct, and train our employees in the correct use of cloth masks.
- Shall make arrangements for the washing, drying and ironing of cloth masks.
- Shall display notices advising persons other than employees entering the workplace of the precautions they are required to observe while in the workplace.
- Require members of the public, including suppliers, to wear masks when inside the Contractors premises.

PCVD 1.7 Ventilation.

The Contractors shall keep the workplace well ventilated by natural or mechanical means to reduce the SARS-CoV-2 viral load;

PCVD 1.8 Training and communication

- The Principal Contractor and Contractors shall develop a Covid 19 policy. The policy shall be promptly displayed and communicated to all employees.
- The Principal Contractor and Contractors shall inform, instruct, and train employees in the correct use of PPE.
- Principal Contractors and Contractors shall provide workers with information that raises awareness in any form or manner, including where reasonably practicable leaflets and notices placed in conspicuous places in the workplace informing our workers of the dangers of the virus, the manner of its transmission, the measures to prevent transmission such as personal hygiene, social distancing, use of masks, cough etiquette and where to go for screening or testing if presenting with the symptoms.

PCVD 1.9 Emergency response.

- If a worker presents any symptoms related to Covid 19, or advises the Contractor of these symptoms, the Principal Contractor shall –
 - Not permit the worker to enter the workplace or report for work or
 - Immediately report the case to the appointed OHS Agent and Resident Employer's Agent.
 - If the worker is already at work immediately-
 - Isolate the worker, arrange for the worker to be transported in a manner that does not place other workers or members of the public at risk either to be self-isolated or for a medical examination or testing; and assess the risk of transmission, disinfect the area and the worker's workstation, refer those workers who may be at risk for screening.
 - Ensure that the worker is tested or referred to an identified testing site.
- The Contractor shall place the employee on paid sick leave in terms of section 22 of the BCEA or if the employee's sick leave entitlement under the section is exhausted, make application for an illness benefit in terms of clause 4 of the Directive issued on 25 March 2020 on the COVID-19 Temporary Employer Relief Scheme under regulation 10(8) of the Regulations promulgated in terms of section 27(2) of the Disaster Management Act;
- Contractors shall ensure that the employee is not discriminated against on grounds of having tested positive for COVID-19 in terms of section 6 of the Employment Equity Act, 1998 (Act No. 55 of 1998).
- If there is evidence that the worker contracted COVID-19 as a result of occupational exposure the Contractors shall lodge a claim for compensation in terms of the Compensation for Occupational Injuries and Diseases Act, 1993 (Act No. 130 of 1993) in accordance with Notice 193 published on 3 March 2020
- If a worker has been diagnosed with COVID-19 and isolated in accordance with the Department of Health Guidelines, a worker will only be allowed to return to work on the following conditions:
 - The worker has undergone a medical evaluation confirming that the worker has been tested negative for COVID-19.
 - Contractors shall ensure that personal hygiene, wearing of masks, social distancing, and cough etiquette is strictly adhered to by the worker; and that we closely monitor the worker for symptoms on return to work.

PART C6

LIST OF TENDER DRAWINGS

C 6.1 Drawings

Plan & Long Sections		
622-02-310	1	Plan & Long Section Sheet 1
622-02-310	2	Plan & Long Section Sheet 2
622-02-310	3	Plan & Long Section Sheet 3
622-02-310	4	Plan & Long Section Sheet 4
622-02-310	5	Plan & Long Section Sheet 5
Pipework & Chambers		
622-02-311		DN250 Scour Valve Chamber
622-02-312		Air Valve Chamber Type 1
622-02-313		Air Valve Chamber Type 2 & 3
Standard Drawings		
622-02-314		GRP Access Ladder
622-02-315	1	Standard Details

622-02-315	2	Standard Details
622-02-316		Trench Details
Mapbook		
622-02-319	1	Rising Main Mapbook
622-02-319	2	Rising Main Mapbook
622-02-319	3	Rising Main Mapbook
622-02-319	4	Rising Main Mapbook
622-02-319	5	Rising Main Mapbook
622-02-319	6	Rising Main Mapbook
622-02-320		Temporary Working Space Overview

DRAFT DO NOT USE

PART C7

ANNEXURES

DRAFT DO NOT USE

C 7.1 Project Specific Particular Specifications

Mhlathuze Water PA specs to adhere to:

ITEM #	DESCRIPTION
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1	UUW DN200 To DN2200 Fittings with Supplier comments
2	UUW DN200 To DN2200 Steel Pipe supply and Manufacture
3	UUW Electrical Spec
4	UUW Galv Steel Repair
5	UUW Instrumentation Specification
6	UUW SCADA Specifications
7	UUW Standard Spec for Mechanical Works
8	UUW Technical Spec for Electrical Installations
9	UUW_PA_AirValves & Vacuum Break Valves
10	UUW_PA_Blockwork
11	UUW_PA_Disinfection of Potable Water Facilities
12	UUW_PA_Double Flanged Butterfly Valves for sizes 400NB
13	UUW_PA_Operation and Maintenance Manuals
14	UUW_PA_Particular Spec for Valves
15	UUW_PA_Quality Assurance Procedures
16	UUW_PA_Steel Pipe Insulating Flange Joints
17	UUW_PA_Technical Spec for Cathodic Protection Installations
18	UUW_PA_Technical Spec for Operations and Maintenance Manual
19	UUW_PA_Wedge Gate and Resilient Seal Gate Valves

Project Particular specifications

ITEM #	DESCRIPTION
C5.2.1	PA for brickwork

C5.2.2	PA for Corrosion Protection replacing section PSL 3.9 of SABS 1200
C5.2.7	PA for commissioning requirements

Other annexures

ITEM #	DESCRIPTION
1	EMPr
2	Employer's Health and Safety Specification
3	Baseline risk assessment

C 7.2 Other documents

Annexure A - Electronic Book of Drawings

Annexure B – Excel Tender BoQ (for information only)

Annexure C – Geotechnical Report

Annexure D – Particular Specifications (As defined in C7.1)

Annexure E – H&S Docs & Specification (As defined in C7.1)

Annexure F – Environmental Docs & Specification (As defined in C7.1)

Annexure G – DTI Docs

Annexure H – Contract Signboard