CLUSTER

Trading Services

UNIT

Water and Sanitation

DEPARTMENT

Sanitation Operations

PROCUREMENT DOCUMENT

INFRASTRUCTURE

Documents are to be obtained, free of charge, in electronic format, from the National Treasury's eTenders website or the eThekwini Municipality's website.

Contract No: 30661-5W

Contract Title: Construction of the Southern Wastewater Treatment Works Multidisciplinary Upgrades

Est. CIDB Grade/ Class: 9 9EP and 9ME

CLARIFICATION MEETING AND QUERIES

Clarification Meeting: Compulsory Clarification Meeting

Meeting Location, Date, Time: Southern Wastewater Treatment Works (@ co-ordinates - 29.955135360820552, 30.97299685576011) on 13 June 2025 at 11h00

Queries can be addressed to The Employer's Agent's Representative:
Name: Shanir Ramjathan
Tel: +27 (0)31 254 5700
eMail: Shanir.r@ixengineers.co.za.co.za

TENDER SUBMISSION

Delivery Location: The Tender Box in the foyer of the Municipal Building 166 KE Masinga Road, Durban

Closing Date/ Time: Friday,04 July 2025 at 11h00

FACSIMILE, eMAIL, or POSTED TENDERS WILL NOT BE ACCEPTED

Issued by:

ETHEKWINI MUNICIPALITY

Deputy Head: Water and Sanitation

Date of Issue: 30/05/2025

Document Version 01/03/2024

VOLUME 3 OF 9

FOR OFFICIAL USE ONLY

Tenderer Name:			VAT Registered: Yes No
	Price (excl)	VAT	Price (incl)
Submitted:	R	R	R
Corrected:	R	R	R

INDEX to TENDER DOCUMENT - VOLUMES

This Tender Document consists of 9 (Nine) Volumes as indicated in the table below.

Volume	Description	Contents
1 of 9	Tender Document	Tendering Procedures Returnable Documents Agreement and Contract Data Scope of Work Site Information
2 of 9	Pricing Data	Pricing Assumptions / Instructions Bill of Quantities
3 of 9	**Standard Specifications (This Document)**	**Standard Specifications** **Amendments to standard Specifications**
4 of 9	Electrical	Standard Specifications Particular Specifications - MV Particular Specifications - OHS Data Sheets
5 of 9	Mechanical	Standard Specifications Project Specifications - Mechanical Particular Specifications – Lifting Equipment Mechanical Data Sheets
6 of 9	Building Work	Particular Specifications
7 of 9	HVAC Services	Project Specifications - HVAC Particular Specifications - HVAC Pricing Instructions - HVAC Returnable Schedule - HVAC Inspection Sheet - HVAC
8 of 9	Annexures	Quality Assurance, Transport, Installation, Testing and Commissioning Environmental Management Plan Employer's Health and Safety Specification Employers Standard Electrical Standard Specifications Employers Standard Mechanical Specifications Employer Control Instrumentation Project Specification
9 of 9	Drawings	General Drawings Electrical Drawings Mechanical Drawings Building Work Drawings Structural Drawings HVAC Drawings Civil Drawings

Declaration by Tenderer

I, the undersigned, hereby declare and confirm that I have obtained all 9 (Nine) of the Tender Document Volumes as indicated in the table above.

NAME (Block Capitals): _____ **Date**

SIGNATURE: ---------- ----------

This Tender Document (Volume 3 of 9: Standard Specifciations) consists of the following Documents.

C3.3 STANDARD SPECIFICATIONS
C3.3.2 AMENDMENTS TO STANDARD SPECIFRICATIONS

C3.3: STANDARD SPECIFICATIONS

C3.3.1 The Specifications on which this contract is based are the South Africa National Standards (SANS) 1200 specifications. This document is obtainable separately, and Tenderers shall obtain their own copies of the applicable Sections.

Some of the applicable SANS 1200 specifications are listed below, however, the entire SANS 1200 is applicable to this contract.

SANS 1200 A	General
SANS 1200 AB	Engineer's office
SANS 1200 C	Site Clearance
SANS 1200 D	Earthworks
SANS 1200 DB	Earthworks (Pipe Trenches)
SANS 1200 G	Concrete (Structural)
SANS 1200 H	Structural Steelwork
SANS 1200 HA	Structural Steelwork (Sundry items)
SANS 1200 L	Medium Pressure Pipelines
SANS 1200 M	Roads – General
SANS 1200 ME	Sub-Base
SANS 1200 MF	Base
SANS 1200 MJ	Segmented Paving
SANS 1200 MK	Kerbing and Channelling
SNAS 1200 MM	Ancillary Roadworks

C3.3.2 AMENDMENTS TO THE STANDARD SPECIFICATIONS

INTRODUCTION

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

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

Amendments to the standard specifications for the various disciplines are contained in the discipline specific Tendre Document Volumes.

PS A	General
PS AB	Engineer's office
PS C	Site Clearance
PS D	Earthworks
PS G	Concrete (Structural)
PS H	Structural Steelwork
PS HA	Structural Steelwork (Sundry items)

SANS 1200 A: GENERAL

PS A 3 MATERIALS

PS A 3.1 QUALITY (Subclause 3.1)

Substitute the second sentence of the first paragraph of subclause A 3.1 with the following:

All material used in the Works shall, where such mark has been awarded for a specific type of material, bear the SABS (SANS) mark. Alternatively, the Contractor shall furnish the Engineer with certificates of compliance of materials, which bear the official mark of the appropriate standard.

Substitute the second paragraph with the following:

The Contractor is responsible for the cost of all testing to ascertain that the materials do comply with the relevant minimum requirements and all such costs shall be deemed to be included in the tendered rates. The cost of control tests done by the Engineer and of which the results do not comply with the minimum requirements shall be for the Contractor's account.

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

The handling, storage, transport and erection of equipment, machinery and materials shall be strictly in accordance with the requirements of the supplier and or manufacturer.

All materials shall be new and of the best quality available unless otherwise specified. Materials must function satisfactorily under prevailing climate and weather conditions at the place of installation.

PS A 3.3 DELAY DUE TO SUPPLY OF MATERIALS

Add new sub-clause A 3.3:

The Contractor shall ensure that the work is not delayed, due to the lack of materials on the site of the Works, by placing orders with suppliers for the required materials timeously.

PS A 4 PLANT

PS A 4.2 CONTRACTOR'S OFFICES, STORES AND SERVICES

PS A 4.2.1 Contractor's Camp

The Contractor's camp shall be kept clean at all times during construction and conform to the requirements and regulations of the Employer and the applicable Environmental Management Plan.

The Contractor must fence off his construction camp area. All temporary fencing must be removed on completion of the Contract.

The camp may be used for the working hours activities of the Contractor's and the Employer's personnel and for all related facilities required by the Contractor and the Employer such as workshops, stores, testing laboratories.

The Contractor shall at all times conform to all requirements contained in law or bylaws, as well as any other requirements set by the controlling local authority or the Mine.

The Contractor shall water all access roads to the construction camp, as well as working areas used by vehicles inside the camps, twice daily including weekends as required or as may be directed by the Engineer, to prevent dust nuisance and dust being churned up by vehicles or wind.

At the completion of the construction work, the Contractor must break down and remove all concrete slabs, etc. in the construction camps and at the batching plant (if applicable), remove all rubble from the camp site and hand back the site(s) in a clean and tidy condition.

No Certificate of Completion shall be issued for the Works unless the site clearing is done to the satisfaction of the Engineer.

PS A 4.2.2 Source of Water Supply

The Contractor shall be responsible under the Contract for the supply and distribution at his cost of all water that he may require for purposes of constructing, testing and commissioning the Works. A water meter shall be installed for the duration of the contract on the water supply point identified. The water meter shall be read periodically by the Engineer to keep record.

PS A 4.2.3 Source of Power Supply

The Contractor shall be responsible under the Contract for the supply and distribution at his cost of all electricity that he may require for purposes of constructing the Works. A electricity meter shall be installed for the duration of the contract on the supply point identified. The meter shall be read periodically by the Engineer to keep record.

PS A 4.2.4 Sanitary Facilities

Ablution facilities shall be kept hygienic at all times. The Contractor shall at all times during construction of the Works provide adequate sanitary facilities at all working fronts and places of work.

PS A 4.2.5 Housing

The Contractor will not be permitted to house any personnel within his camp site unless the Employer approves a written request to this end by the Contractor.

A 5 CONSTRUCTION

PS A 5.2 Watching, Barricading, Lighting and Traffic Crossings

Road traffic signs shall comply with the requirements of the "South African Road Traffic Signs Manual" and shall be approved by the Engineer before construction commences.

PS A 5.4 Protection of Overhead and Underground Services (Subclause A 5.4)

Add the following to sub-clause A 5.4:

The position and details of all existing services and structures known to the Engineer are shown on the Drawings. The Drawings show the best information available to the Employer at time of tender. The Employer takes no responsibility as to the accuracy or completeness of this information and has provided this information merely as an aid to the Tenderer in preparing their bids for construction of the Works.

The Contractor shall protect all known existing services. Any damage caused to these services or structures, or any obstructions or hindrance caused to others by the Contractor and all claims arising from such damage, obstruction or hindrance shall be the sole responsibility of the Contractor.

All repair work shall be carried out at the Contractor's expense to the entire satisfaction of the Engineer or the appropriate authority. The same obligations shall be imposed on the Employer and on other contractors employed by the Employer in respect of the Works being executed under this Contract.

The Contractor shall conduct the necessary search for unknown services as required by the Standard Specifications. After searching, all services shall be deemed as known. The Contractors' cost of searching for existing services and accommodating all existing services and relocating all services shall be priced into the appropriate items forming part of the Contract.

The Contractor shall deal with the crossing of known existing services by:

- Notifying to the Engineer's Representative and the relevant authority 48 hours prior to executing the work.
- Serving notice on the resident, occupier and/or owner of every property affected at least 36 hours in advance of any temporary disconnection, advising the nature, time and duration.
- Excavating by hand, under the supervision of the Engineer's Representative and/or the authority involved, on the line of the trench up to 2 m, or such for the distance as may be necessary, in both directions from the indicated position to locate the exact position of the services.

A 7 TESTING

PS A 7.4 STATISTICAL ANALYSIS OF CONTROL TESTS (Subclause A 5.4)

Substitute sub-clause A 7.4 with the following:

Test results shall not be evaluated by statistical methods. All results shall comply with the specified minimum requirements of the materials concerned.

PS A 7.5 PROCESS CONTROL

Add new sub-clause A 7.5:

All test results obtained by the Contractor in the course of construction of the Works shall be submitted to the Engineer or his Representative prior to requesting inspection of the relevant

portions of the Works. Any request for inspection shall be submitted on the prescribed forms that will be issued once the Contract has been awarded.

A 8 MEASUREMENT AND PAYMENT

A 8.2 PAYMENT

PS A 8.2.1 Fixed-Charge and Value-Related Items

The sums tendered for fixed charge and value related items will not be increased should extension of time be allowed for completion of the Contract.

PS A 8.2.2 Time Related Items

The tendered amount for a time related item will be increased if an extension of time for the completion of the works is awarded on the condition that the activity related to the item tendered for must be sustained during the extended period.

The ratio between the increased amount for a time related item and the tendered amount must be the same as the ratio between the extension of the time period for the completion of the works and the original time period allowed for completion of the works.

If the works is completed before the end of the original time period allowed for completion of the works, the tendered amount of a time related item that is influenced by the earlier completion will be reduced similarly.

A 8.3 SCHEDULED FIXED-CHARGE AND VALUE-RELATED ITEMS

PS A 8.3.3 **Other Fixed-Charge Obligations** (Subclause A 8.3.3)

Add the following to sub-clause A 8.3.3:

The cost of all sampling and testing executed by the Contractor or approved laboratory must be included in this amount and no separate payment shall be made for this. This condition also relates to the casting, curing and testing of concrete cubes.

PS A 8.3.5 Compliance with the Occupational Health and Safety Act (Act 85 of 1993) and its Regulations.

The fixed charge item shall cover all fixed charge costs necessary to achieve full compliance with the requirements and obligations of the Occupational Health and Safety Act (Act 85 of 1993).

This fixed charge related item shall cover all time related costs necessary to achieve compliance with any temporary requirements and obligations of the special Health related Regulations (ex. Covid 19).

PS A 8.3.6 Compliance with the Environmental Management Plan.

The fixed charge item shall cover all fixed charge costs necessary to achieve full compliance with the requirements and obligations of the Environmental Management Plan. The Environmental Management Plan is included in Volume 8 - Annexures**.**

A 8.4 SCHEDULED TIME-RELATED ITEMS

PS A 8.4.5 Other Time-Related Obligations (Subclause A 8.4.5)

Add the following to sub-clause A 8.4.5:

The cost of all sampling and testing executed by the Contractor or approved laboratory must be included in this amount and no separate payment shall be made for this. This condition also relates to the casting, curing and testing of concrete cubes.

PS A 8.4.6 Compliance with Occupational Health and Safety Act (Act 85 of 1993) and its Regulations.

The time related item shall cover all time related costs deemed necessary to achieve full compliance with the requirements and obligations of the Occupational Health and Safety Act (Act 85 of 1993).

This time related charge related item shall cover all time related costs necessary to achieve compliance with any temporary requirements and obligations of the special Health related Regulations (ex. Covid 19).

PS A 8.4.7 Compliance with the Environmental Management Plan.

The time related item shall cover all time related costs necessary to achieve compliance with the requirements and obligations of the Environmental Management Plan (EMP). The Environmental Management Plan is included in Volume 8 – Annexures.

PS A 8.5 SUMS STATED PROVISIONALLY

PS A 8.5.1 Control Testing

Provision has been made in the Bill of Quantities for control testing ordered by the Engineer and to be undertaken by a commercial laboratory. Payment will be based on the actual invoicing by the laboratory to the Contractor. The costs for control tests instructed by the Engineer and of which the results do not comply with the minimum requirements shall be for the Contractor's account.

In addition to the abovementioned amount, provision is made in the Bill of Quantities for a mark-up on the amount to be paid. The mark-up shall be regarded as full compensation for overheads, charges and profits as provided for in Clause 6.6 of the General Conditions of Contract for Construction Works (Third Edition, 2015).

PS A 8.8 TEMPORARY WORKS

PS A 8.8.2 Dealing with Traffic (Subclause A 8.8.2)

Add the following to sub-clause A 8.8.2:

The rate shall cover all costs pertaining to the provision, erection, moving, re-erection and maintenance of all temporary barricades, road traffic signs, lights, flagmen, etc. as required, for the guarding and protection of the Works, for the construction, gravelling and maintenance of access roads and detours to the site of the Works, borrow pits or spoil sites, as well as for

the later removal or the cleaning and tidying up thereof, for making the necessary traffic arrangements and arrangements with regard to the moving and/or re-erection of existing traffic signs, as well as all other costs to accommodate the traffic during construction.

Separate items will be scheduled for the fixed and time-related costs of the work.

PS A 8.9 Miscellaneous Items

Add new payment clause A 8.9:

An item which, in the payment clause column of the Bill of Quantities, refers to this clause (PS A 8.10), will be measured in the unit scheduled in the Bill of Quantities. Where relevant, separate items will be scheduled for the fixed and time-related costs of the item.

The sum or rate for such an item shall cover the cost of all temporary works, materials, labour and plant required to execute and complete the work as specified, described in the Bill of Quantities or shown on the drawings.

PS A 8.10 Permanent and/or Temporary Works Not Measured

Add new payment clause A 8.10:

The Contractor shall specify and price any/all permanent and/or temporary works not specifically itemized and measured in the Bill of Quantities for the complete execution of the Contract in terms of the General Conditions of Contract for Construction Works (Third Edition, 2015) and Scope of Works.

PS A 8.11 Dealing with Existing Services

Add new payment clause A 8.11:

Dealing with existing services (Above ground or underground) will not be measured separately. Payment will be made by lump sum.

The sum tendered for dealing with existing services shall cover:

- The cost of meeting the requirements of subclause 8.3.5 of SANS 1200 DB.
- The cost of meeting the requirements of subclause 8.3.8.2 of SANS 1200 D
- The cost of meeting the requirements of subclause 8.8.4 of SANS 1200 A (Excluding the careful excavation by hand to locate a service)
- The cost of meeting the requirements of PS A 5.4 (Excluding the careful excavation by hand to locate a service and the supply or hire and use of specialist equipment to locate underground services).
- The cost arising from the limiting influence of existing aboveground and underground services on the Contractor's activities.
- Dealing with and protecting poles affected by excavations and dealing with and working below overhead wires.
- The cost of dealing with and protecting and keeping safe all aboveground and underground existing services.

- The costs of delays and disruptions in the progress of the work which arises form dealing with and protection of existing services.

PS A 8.12 Services Detection

Add new payment clause A 8.12:

Where uncertainty exist on the existing services in the vicinity of construction works to be executed. The Contractor shall perform GPR services detection in order to locate existing services. The rate shall include all equipment, sub-contractors or labour required to perform this activity.

PS A 8.13 Overhaul and Additional Transport

Add new payment clause A 8.13:

Notwithstanding any clause or clauses in any Standardized Specification or Standard Specification Section dealing with the definition, measurement and/or payment for transport, feehaul and/or overhaul, no measurement nor payment for overhaul will be made. All haulage will be considered to be freehaul and the cost thereof will be deemed to be covered by the rates for the provision or disposal of the applicable material.

PS A 8.14 Dealing with Water

Add new payment clause A 8.14:

Payment for dealing with water will be made as follows:

1) Provide equipment (Unit = Sum)
2) Operate and maintain equipment (Unit = Days or Sum or as scheduled)
3) Remove equipment (Unit = Sum)

The sum for the provision and removal of equipment shall cover the cost of providing the necessary plant or material or both (Pumps, well points, sheeting, close timbering and other equipment, etc), fully erected and operative on the Site, and the removing of such goods and restoring the Site to its original condition on completion of that part of the project for which the temporary works were erected.

The rate for operation and maintenance shall cover the cost of operating and maintaining the pumps, well points, sheeting, close timbering and other equipment, as applicable, for 24 hours a day, 7 days a week throughout the period during which, in the opinion of the Engineer, the facilities are required.

PS A 8.15 Returning to Site

Add new payment clause A 8.15:

This items shall only be used if deemed necessary, in the event that the contractor cannot commission or handover the final project by the time site de-mobilization takes place. This item shall only be enacted to an event outside of the Contractor’s control. Th rate shall include

the temporary establishment of a site office for the duration of the commissioning phase, mobilization of any equipment required to complete commissioning.

PS A 8.16 HAZOP studies

Add new payment clause A 8.16:

The Contractor is to conduct (arrange and facilitate) a Hazard and Operability (HAZOP) study for both the mechanical and electrical disciplines once the final suppliers information is available.

PS A 8.17 Compulsory Data Pack

Add new payment clause A 8.17:

The Contractor is to provide a complete data pack containing all technical data of equipment supplied under the Mechanical, Electrical and HVAC scope, test and FAT results, 2 complete sets of O&M manuals and IOM information.

PS A 8.18 Operational Training

Add new payment clause A 8.18:

The Contractor shall conduct training sessions with the eThekwini Municipality Operational Staff during the Commissioning and Handover phase of the project, for all electrical and mechanical equipment installed. The training shall cover all installed equipment, including but not limited to pump controls, VSD's, MV switchgear, HVAC, Overhead crane and other equipment.

SANS 1200 AB: ENGINEER'S OFFICE

AB MATERIALS

PS AB 3.1 NAMEBOARDS

The Contractor shall supply and erect two name boards in accordance with the details shown on the Drawing and in positions instructed by the Engineer.

PS AB 3.2 OFFICE BUILDING

The Contractor shall provide and erect one office building for the Engineer., in accordance with Subclause 3.2, in the position indicated by the Engineer. The office shal measure 4.0 m X 6.0 m. Concrete floors will be permitted for the office provided they are covered with linoleum. All windows in the office shall be fitted with blinds and burglar proofing over the entire glazed area and with fly screens over the openings.

In addition to the furnishings specified in Subclause 3.2, the following facilities shall be provided:

- 1 X plan cabinet (Steel)
- 2 X 15 A power sockets
- 1 X air conditioner for warm / cool air, with a cooling capacity of at least 2.0 kW

PS AB 3.4 PROTECTIVE CLOTHING

The Contractor shall provide and replace when necessary five sets of the following:

- Safety helmets (Of sizes as required)
- Safety boots (Of sizes as required)
- Reflective vests
- Ear protection
- Eye protection

AB 4 PLANT

PS AB 4.1 SURVEY EQUIPMENT

The Contractor shall provide the following survey equipment:

- One engineer's automatic level with tripod
- One level staff with staff bubble
- One builder's spirit level with a length of 900 mm
- One steel tape of length 30 m
- One pocket tape of length 3 m

The Contractor shall provide proof, at the start of the Contract, that the level have recently been serviced by an acceptable institution and shall, through the period of construction,

service and maintain all survey equipment and he shall insure same and indemnify the Employer and the Engineer against all claims for loss, breakage or theft of such equipment.

AB 5 CONSTRUCTION

PS AB 5.1 ADDITIONAL CONTROL TESTING

At the request of the Engineer, the Contractor shall arrange separately with an independent commercial laboratory and/or designated specialists to carry out additional acceptance control tests, over and above the normal quality control testing required by the Contractor for the construction of the Works. A provisional sum is included in the contract for the additional control tests ordered by the Engineer. The Contractor shall remain responsible to carry out the process control testing required by the Standardized, Particular and Project Specifications.

PS AB 5.2 SITE INSTRUCTION BOOK

The Contractor shall supply a carbon quadruplicate book as a site instruction book.

The book shall be kept on Site and shall be accessible to both the Contractor and the Engineer at all times.

The site instruction book shall be used:

- By the Contractor for providing the Engineer with any information regarding the construction of the Works which may be requested, and giving notification in writing of inspections, drawings, etc, required by the Contractor.

- By the Engineer for the purpose of writing day-to-day instructions and confirming any verbal information or instructions given to the Contractor.

SANS 1200 C: SITE CLEARANCE

C3 MATERIALS

C5 CONSTRUCTION

PS C 5.1 AREAS TO BE CLEARED AND GRUBBED (Subclause 5.1)

Substitute the first sentence of sub-clause C 5.1 with the following:

Only the approved minimum area required for the execution of the works including areas on which material shall be stockpiled for later re-use or on which material shall be dumped and spread, shall be cleared and grubbed. No trees with a trunk girth of more than 1.0 m shall be removed without the written permission of the Engineer. The vegetation cleared shall be disposed of by approved means. All rubble on the Site shall be disposed of by approved means.

Measurement and payment for clearing and grubbing shall only occur for areas as required in writing by the Engineer.

The Contractor may proceed with clearing and grubbing after the handing over of the site only after written approval from the Engineer has been obtained.

Substitute the last paragraph with the following:

The Contractor shall program his work in such a manner that re-clearing will not be necessary. The cost of re-clearing shall be borne by the Contractor.

C 5.2 CUTTING OF TREES

C 5.2.3 Preservation of Trees

PS C 5.2.3.2 Individual Trees (Subclause 5.2.3.2)

Add the following to sub-clause 5.2.3.2:

Trees outside the site working area must be left standing and undamaged, except where otherwise ordered in writing by the Engineer. An amount of R 1,000 will be deducted from moneys due to the Contractor as a penalty for every tree that is damaged or removed unnecessarily.

PS C 5.6 CONSERVATION OF TOPSOIL (Subclause 5.6)

Add the following to subclause 5.6:

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

C 8 MEASUREMENT AND PAYMENT

PS C 8.2.1 Clear and Grub (Subclause 8.2.1)

Add the following to sub-clause 8.2.1:

The area designated by the Engineer to be cleared and grubbed will be measured in the unit as scheduled in the Bill of Quantities.

PS C 8.2.11 Remove and re-erect existing fences ..... Unit: m

Add new payment clause C 8.2.11:

The rate shall cover the cost of removal and stacking of fencing material, including all gates, as well as the re-erection thereof with the existing material. No payment will be made for the replacement of fencing material that has been damaged by the Contractor and all costs for this are deemed to be covered by the rate for the appropriate items.

Material that is unsuitable for re-erection must be viewed by the Engineer before it is removed. Only by written approval from the Engineer can the Contractor claim advance compensation for such material.

SANS 1200 D: EARTHWORKS

D 2 INTERPRETATIONS

PS D 2.1 SUPPORTING SPECIFICATIONS

Replace sub-clause D 2.1 with the following:

Any of the other SABS/SANS 1200 specifications may form part of the Contract documents.

D 3 MATERIALS

D 3.1 CLASSIFICATION FOR EXCAVATION PURPOSES

PS D 3.1.2 Classes of Excavation (Subclause 3.1.2)

All material that is not classified as hard rock excavation in terms of clause 3.1.2 (c), shall be classified as soft excavation. Excavation classified as intermediate or boulder excavation in terms of clauses 3.1.2 (b), (d) or (e) will be considered to be included under soft excavation.

D 3.3 SELECTION

PS D 3.3.1 General (Subclause 3.3.1)

The Contractor shall deal selectively with material from general excavation.

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

PS D 3.3.3 Borrow Area

Add new sub-clause D 3.3.3:

Approval of a borrow area for a certain purpose does not necessarily mean that all the material in that area is suitable for the specified purpose. What it does mean is that the borrow area contains some suitable material. The responsibility shall rest on the Contractor to ensure that only material that is indeed suitable is removed and used for the specified purpose.

When the Contractor has to select excavated material for a specific purpose, the above provisions relating to borrow areas shall apply mutatis mutandis to excavations.

PS D 3.4 PHYSICAL PROPERTIES

Add new sub-clause D 3.4:

Geotextile: Geotextile material shall be a nonwoven, needle punched continuous filament polyester geotextile compliant to SANS 1200 DK and SANS 10221, equal to Kaytech Bidim

Class A4 (or similar approved), or to the classification as indicated on the drawings or specified in the BOQ.

Stone Pitching: The stone pitching must comply with the appropriate requirements of SANS 1200 DK: Gabions and Pitching. The size of the pitching shall be Medium (Table 2 of SANS 1200 DK).

Crushed Stone: Crushed stone in subsoil drains shall be 19 mm single-sized stone complying with the grading requirements of stone for concrete in SANS 1083.

D 4 PLANT

PS D 4.4 DETECTORS (Subclause 4.4)

The Contractor shall, for the purposes of detecting and locating underground services in accordance with the provisions of sub-clause 5.4 of SANS 1200 A and sub-clause 5.1.2 of SANS 1200 D, provide and use detecting equipment which is suitable for the detection of underground cables and pipes. Where relevant, allowance shall be made in the Bill of Quantities for payment for the provision and use of detection equipment.

D 5 CONSTRUCTION

D 5.1 PRECAUTIONS

PS D 5.1.1.2 Safeguarding of Excavations (Subclause D 5.1.1.2)

Add the following to sub-clause D 5.1.1.2:

Any cost the Contractor may undergo in ensuring the safety of excavations or any additional excavation and backfilling he may have to undertake due to the unstable sides of excavations and trenches shall be held to be for his account and the various rates for excavation and trenching included in the Bill of Quantities shall include full compensation for it.

D 5.1.2 Existing Services

PS D 5.1.2.4 Protection during Construction

Add new sub-clause D 5.1.2.4:

Further to the requirements of sub-clause 5.4 of SANS 1200 A (as amended), major excavating equipment and other plant shall not be operated dangerously close to known services. Where necessary, excavation in close proximity to known services shall be carefully carried out with suitable hand tools, excluding picks wherever their use could damage the services.

Should any service not being a known service be discovered or encountered during the course of the Contract, the Contractor shall, in addition to complying with the requirements of sub-clause 5.4 of SANS 1200 A (as amended), immediately notify the Engineer thereof and implement such measures as will prevent damage of such service or, if it was damaged in the course of discovery, will prevent and minimise the occurrence of any further damage occurring.

PS D 5.1.4.1 Dust Nuisance (Subclause D 5.1.4.1)

Add the following to sub-clause D 5.1.4.1:

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

PS D 5.1.6 Road Traffic Control (Subclause D 5.1.6)

Road traffic signs shall comply with the requirements of the "South African Road Traffic Signs Manual" and shall be approved by the Engineer before construction commences. No additional payment for compliance with subclause 5.1.6 will be made and all costs (labour, road traffic signs, etc.) shall be included under PS A 8.8.2.

D 5.2 METHODS AND PROCEDURES

D 5.2.1 Site Preparation

PS D 5.2.1.2 Conservation of Topsoil (Subclause D 5.2.1.2)

Add the following to sub-clause D 5.2.1.2

Topsoil shall be removed from all areas where structures are to be constructed and shall be stockpiled or spread as and where indicated by the Engineer.

D 5.2.2 Excavation

PS D 5.2.2.1 Excavation for General Earthworks and for Structures (Subclause D 5.2.2.1)

Replace the first sentence of paragraph (e) with the following:

Where excavations have been carried below the authorised levels, the Contractor shall backfill such excavations to the correct level with approved gravel compacted to 90% of modified AASHTO density or to the density of the surrounding material, whichever is the higher density.

Where excavations for structures have been carried out in hard material, the Engineer may direct that over-excavation be backfilled with weak concrete if there is a danger of settlement or differential settlement of the foundations.

PS D 5.2.2.2 Borrow Pits (Subclause D 5.2.2.2)

Add the following to sub-clause D 5.2.2.2:

The Contractor shall in all respect comply with the various requirements of SANS 1200 D and in relation to the opening up, closing down and utilization of borrow pits.

All costs associated with the importation of suitable material from borrow or other sources must be borne by the Contractor, including excavation, crushing, screening, transport and royalties, and the tendered rates for material from borrow must include therefore, as no other payment will be made in this regard.

The closing down of a borrow pit will include all earthworks required to leave the area in a neat condition without irregularities in the surface and with even slopes to the satisfaction of the Engineer and other concerned parties.

PS D 5.2.2.4 Selection and Stockpiling

Add new sub-clause D 5.2.2.4:

Approval or designation of the material in a particular borrow pit or excavation for particular purpose does not imply that all the material in the borrow pit or excavation is suitable for the particular purpose to which the said approval or designation relates, nor that all material in the borrow pit or source should be used for the particular purpose. The Contractor shall select suitable material from that borrow pit or source, discard unsuitable material and reserve material for other purposes as necessary.

The Contractor shall organize and carry out his operations in such a manner as will prevent the contamination of suitable embankment and backfill material with unsuitable materials. Any excavated material which becomes, in the Engineer's opinion, unsuitable for use in embankments or backfill as a result of contamination, shall be disposed of in a manner acceptable to the Engineer and shall be replaced by the Contractor with materials acceptable to the Engineer, all at the Contractor's cost.

When required, or when ordered by the Engineer, material shall be stockpiled for later use. The additional costs for stockpiling material shall be paid to the Contractor in accordance with the provisions of sub-clause PS D 8.3.14.

PS D 5.2.3.2(b) Restricted Backfilling (Subclause D 5.2.3.2(b))

Add the following to sub-clause D 5.2.3.2 (b):

The backfilling of excavations along the perimeter of chambers or structures, to provide workspace for vertical shuttering must be placed in + 200mm layers and compacted to 90% Mod AASHTO with material from the excavation or with material from approved borrow pits.

D 5.2.5 Transport for Earthworks

PS D 5.2.5.1 Freehaul (Subclause D 5.2.5.1)

Substitute sub-clause D 5.2.5.1 with the following:

Notwithstanding any clause in any standardized specification in respect of the definition, no payment will be made for overhaul and all transport shall be regarded as freehaul and the costs thereof shall be covered by the relevant tendered rates in the Bill of Quantities.

PS D 5.2.5.2 Overhaul (Subclause D 5.2.5.2)

Substitute sub-clause D 5.2.5.2 with the following:

Notwithstanding any clause in any standardized specification in respect of the definition, no payment will be made for overhaul and all transport shall be regarded as freehaul and the costs thereof shall be covered by the relevant tendered rates in the Bill of Quantities.

D 7 TESTING

PS D 7.2 Taking and Testing of Samples (Subclause D 7.2)

The Contractor shall carry out sufficient tests on a regular basis as agreed between him and the Engineer to determine whether the degree of compaction, and, where applicable, the quality of materials used, comply with the Specifications and shall submit the results of these tests to the Engineer in a form approved by him.

D 8 MEASUREMENT AND PAYMENT

D 8.3 SCHEDULED ITEMS

D 8.3.8 Existing Services

D 8.3.8.1 Location

PS D 8.3.8.1(c) Excavate by hand in soft material to expose services

Add the following to D 8.3.8.1(c):

The unit of measurement shall be the cubic meter of material excavated by hand.

Excavation by hand to expose existing services shall only be measured and paid for if so ordered in writing by the Engineer. After the excavation of trial holes to determine the exact position and depth of existing services as described in PS D 5.1.2.2, the excavation to a level of 300 mm above such services shall be measured and paid for as normal excavation, independent of the depth of such excavation. Only excavation within 300 mm of the existing services will be measured and paid for as excavation by hand and then only if ordered in writing by the Engineer.

If such services are damaged or removed, it has to be repaired or replaced immediately to its original position and condition, which is acceptable for the Engineer.

PS D 8.3.14 Bulk and Restricted Excavation (Subclauses 8.3.2 and 8.3.3)

The unit rate for excavation shall cover the cost of excavation in all materials with the only extra-over items payable being those for excavation in hard rock. Excavation classified as intermediate or boulder excavation in terms of clauses 3.1.2 (b), (d) or (e) will not be measured and paid for separately and will be considered to be included under soft excavation. Only soft or hard material will be paid.

PS D 8.3.15 Extra over items PS D 8.3.2(a) and PS D 8.3.3 (b)

Extra over items for material classified as

1) Intermediate excavation

3) Boulder excavation, Class A

4) Boulder excavation Class B

in subclauses 8.3.2 (a) and 8.3.3 (b).

Excavation classified as intermediate or boulder excavation in terms of clauses 3.1.2 (b), (d) or (e) will not be measured and paid for separately and will be considered to be included under soft excavation. Only soft or hard material will be paid. The unit rate for excavation shall cover the cost of excavation in all materials with the only extra-over items payable being those for excavation in hard rock.

PS D 8.3.16 Extra over items PS D 8.3.2(a) and PS D 8.3.3 (b)

Extra over item for temporary stockpiling of material from necessary excavations.

Add new payment clause D 8.3.14:

The unit of measurement shall be the cubic meter of material from necessary excavations, temporarily stockpiled by the Contractor on the instructions of the Engineer, before being used in embankments or backfill. Measurements shall be taken in place in compacted embankment or backfill as the case may be.

The tendered rate shall include for the costs, additional to those provided for in PS D 8.3.2 (a) and PS D 8.3.3, for off-loading, forming and maintaining the stockpile for as long as is required, reloading and transporting within the applicable free-haul distance from the stockpile.

Payments to the Contractor under this item will only be made in respect of that material stockpiled on the instructions of the Engineer (which instruction shall state specifically that payments for such stockpiling will be paid for under this item) and no payments will be made to the Contractor under this item in respect of materials stockpiled by the Contractor on his own volition, nor for materials necessarily stockpiled by the Contractor in consequence of the sequence of operations adopted by him in the course of executing the works, whether such stockpiling was avoidable or otherwise.

PS D 8.3.17 Geotextile

Geotextile will be measured by square meter. The tariff includes the cost for the provision, off-loading and placing of the geotextile material including the cost of cutting, waste, joining, overlapping and fixing of material.

PS D 8.3.18 Filter stone

Filter stone will be measured by cubic meter. The volume measured for payment is the net volume according to the dimensions as shown on the drawings or as requested by the Engineer. The rate shall cover the cost of obtaining, delivery and placing as indicated on the drawings.

PS D 8.3.19 Stone Pitching

Stone pitching will be measured by square meter. The rate shall cover the cost of locating a suitable source, loading, transport, unloading, surface preparation and placing of stone pitching 300 mm thick (according to Table 4 of SANS 1200 DK) at positions required by the Engineer or as indicated on the drawings.

SANS 1200 G: CONCRETE (STRUCTURAL)

G 3 MATERIALS

G 3.2 CEMENT

PS G 3.2.1 **Applicable Specifications** (Subclause 3.2.1)

Only Ordinary Portland Cement (OPC) and Pulverised Fly Ash (PFA) shall be used in all concrete for this Contract. No other types of cement (Rapid Hardening cement, PBFC or Milled Granulated Blastfurnace Slag, etc) shall be permitted.

Pulverised Fly Ash shall comply with the following specifications:

a) PFA shall be obtained from only one Power Station, from which the PFA has been approved for use in concrete by the SABS/SANS.

b) All PFA shall comply with the requirements of SABS/SANS 1466.1988.

Pulverised Fly Ash (PFA) shall be used as partial replacement of the Ordinary Portland Cement (OPC) in concrete. The maximum percentage by mass of PFA shall be 33% of the total cementitious material in the concrete, which is defined as the total mass of OPC and PFA, and shall be mixed before delivery to site.

PS G 3.2.3 **Storage of Cement** (Subclause 3.2.3)

Cement which is stored on the Site shall be kept under a cover that provides adequate protection against moisture and other factors that may aggravate deterioration.

Where the cement is supplied in bags, the bags shall be closely and neatly stacked to a height not exceeding 12 bags, and they shall be so arranged that they can be used in the order in which they were delivered to the Site. Different brands and/or types of the same brand shall be stored separately.

The storage of cement in bulk in silos or similar containers shall be permitted, provided that the cement drawn for use is measured by mass and not by volume.

Cement shall not be kept in storage for longer than 6 weeks from the date of manufacture without the Engineer's permission.

The Engineer may order the removal of cement, which is older than 6 weeks, from the Site or the alteration of the design mix if he does allow its use. Alternatively, he may allow the cement to be used in concrete of less critical importance, as in blinding layers.

G 3.4 AGGREGATES

PS G 3.4.1 **Applicable Specifications** (Subclause 3.4.1)

Fine Aggregate

Fine aggregate shall be clean, coarse, sharp drift, pit or river sand entirely free from vegetable or any other foreign matter and shall be in accordance with SANS 1083 (latest

edition). It shall be screened and washed if directed by the Engineer. No dump or crusher sand shall be used.

The water demand of the fine aggregate shall not exceed 195 ℓ/m³.

Fine aggregate shall be stored on a concrete surface and washed sand shall be allowed to drain for at least 24 (twenty-four) hours before use. The Engineer may require the Contractor to test the sand daily (or more frequently if necessary) for moisture content, impurities and grading before use.

Coarse Aggregate

Coarse aggregate for concrete shall be hard, non-friable quartzite or other suitable rock, in accordance with SANS 1083 (latest edition) crushed and screened to the specified sizes, of good shape, clean and free from dust.

PSG 3.4.2 **Use of Plums** (Subclause 3.4.2)

The use of plums will not be permitted.

G 3.5 **ADMIXTURES**

PS G 3.5.2 **Air-entraining Agents**

Air-entraining agents shall not be used in concrete.

G 4 **PLANT**

G 4.5 **FORMWORK**

PS G 4.5.2 **Finish** (Subclause 4.5.2)

All external corners shall be chamfered by the fixing of fillet strips into the corners of the formwork to form 25 mm x 25 mm chamfers, all at no extra payment.

PS G 4.5.3 **Ties** (Subclause 4.5.3)

Permanent metal ties shall have a minimum concrete cover of 40 mm after formwork has been removed. Tie holes shall be filled with an approved expansive cementitious grout similar to "Durabed" of ABE. The product shall be prepared to a non-slump consistency, but where no cracking occurs when pressed into a firm ball. Trial mixes shall be made to arrive at the required working consistency.

G 5 **CONSTRUCTION**

G 5.1 **REINFORCEMENT**

PS G 5.1.2 **Fixing** (Subclause 5.1.2)

The Engineer will inspect the steel reinforcement after it has been fixed in place, the formwork has been cleaned, cover blocks have been positioned, and before concreting commences. The Contractor shall inform the Engineer when the reinforcement is ready for inspection.

Welding of reinforcing steel will not be permitted.

PS G 5.1.3 **Cover** (Subclause 5.1.3)

The cover of concrete over reinforcement, unless otherwise indicated on the drawings, shall in no case be less than 40 mm.

PS G 5.2.1 **Repair of new concrete**

Immediately after the removal of the formwork, the Engineer shall inspect the concrete for defects. Skilled workmen only shall perform all repairs of such defects, by approved methods and to the satisfaction of the Engineer and at the expense of the Contractor.

Repairs shall be carried out as soon as practicable after the removal of the formwork and in any case not longer than twenty four (24) hours after exposure. Concrete that is damaged from any cause and concrete that is honeycombed, fractured or otherwise defective, and concrete which, because of excessive surface depressions must be excavated and built up to bring the surface to the prescribed lines, shall be removed and replaced with mortar or concrete as hereinafter specified or as otherwise directed by the Engineer.

Concrete filling generally of the same class as the damaged concrete shall be used for holes extending entirely through concrete sections and of such a size as will accept concrete and for holes in mass concrete greater in area than 0,1 m² and deeper than 100 mm and for holes in reinforced concrete which are greater in area than 0,15 m² and which extend beyond the reinforcing. Mortar filling composed of sand and cement in the same proportions as used for the concrete and of a consistency such as will make the mortar sufficiently plastic to be easily placed, shall be used for all other imperfections.

A filling shall be bonded tightly to the surface of the area being repaired and shall be bound and free from shrinkage, cracks and hollow areas after the filling has been cured and dried. Curing of repaired areas shall be performed in such a manner and for such periods as the Engineer may direct.

Particular care shall be exercised to ensure that the colour of the repair work shall match as nearly as possible to the colour of the surrounding concrete. No cement washing or plastering shall be carried out except on the written instruction of the Engineer.

PS G 5.2.2 **Preparation of Formwork** (Subclause 5.2.2)

The joints between continuous formwork elements shall be closely butted and, where necessary, if undue leakage is expected, the joints shall be caulked, taped or packed with a sealing gasket, all at no extra payment. Paper, cloth or similar materials shall not be used for this purpose.

The Engineer will inspect the formwork after it has been fixed in place and before concreting commences. The Contractor shall inform the Engineer when the formwork is ready for inspection.

PS G 5.4 PIPES AND CONDUITS

All pipes and specials, which must be installed in the floors and walls of structures, shall be embedded in the concrete during the casting of such concrete. No holes shall be left for the later installation of pipes and specials, without the written approval of the Engineer.

Where such holes have been approved by the Engineer, the Contractor shall be responsible for the grouting-in of such pipes or specials with an approved expansive cementitious grout, regardless of whether or not these have been supplied by himself. The Contractor shall provide a smooth, dense and waterproof finish around the pipes or specials.

The clear space between pipes of any kind embedded in reinforced concrete and the clear space between such pipes and reinforcement shall at any point be not less than -

(a) 50 mm, or

(b) 5 mm plus the maximum size of coarse aggregate,

whichever is the greater.

PS G 5.5 CONCRETE

PS G 5.5.1.2 **Consistency** (Subclause 5.5.1.2)

The slump for concrete to be used in water retaining structures shall not be less than 30 mm and not more than 60 mm.

PS G 5.5.1.3 **Workability** (Subclause 5.5.1.3)

The concrete mix to be used in water retaining structures shall have a water/cement ratio not exceeding 0,5.

PS G 5.5.1.5 **Durability** (Subclause 5.5.1.5)

Concrete shall be so proportioned to ensure that the water/cement ratio does not exceed 0,5 and, to ensure workability, water-reducing admixtures of approved manufacture shall be used in preference to increasing the cement content.

PS G 5.5.1.7 **Strength Concrete** (Subclause 5.5.1.7)

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

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

or admixtures containing chlorides may not be used in concrete for water retaining structures. Other admixtures and constituents may only be used with the approval of, or as specified by the Engineer.

PS G 5.5.7 Construction Joints (Subclause 5.5.7.1)

Construction joints shall be limited to the minimum and shall only be made in positions as shown on the drawings or in positions as specifically approved by the Engineer. Construction joints between tank bottoms, floors, or wall bases, and the walls standing on them shall not be made flush with the supporting surface, but shall be made in the wall 150 mm above the base. The 150 mm high riser wall shall be cast as an integral part of the bottom, floor or base, i.e. the concrete in the riser shall be deposited simultaneously with the concrete in the bottom, floor or base adjacent to it. Where there is a fillet at the bottom of a wall, the construction joint shall be made 150 mm above the fillet. No additional payment for construction joints will be considered and the cost will be deemed to be included in the rates for concrete work.

PS G 5.5.7.4 Expansion Joints (Subclause 5.5.7.4)

Expansion joints shall be formed in positions and in accordance with details as shown on the drawings. All expansion joints shall be formed with an approved closed cell polyethylene fill material with a density of not less than 120 kg/m^3, or as otherwise specified. Joint sealers shall consist of a two component polyurethane sealing compound complying with SANS 1077. Rearguard S-type PVC water stops with centre bulbs shall be installed under floors and Hydrofoil PVC water stops with centre bulbs in walls, as shown on the drawings.

All sealants, fill material and waterstops shall be installed strictly in accordance with the specification of the manufacturers and to the satisfaction of the Engineer. The sealant shall be installed in one operation and jointing to already hardened sealant will not be permitted.

All expansion joints shall be provided with approved bond breaker tape between the fill material and the sealant.

PS G 5.5.7.4.1 Filled Joints (Subclause 5.5.7.4.1)

Filled joints shall be accurately formed to the dimensions shown and with the filler material specified on the Drawings. The filler shall be secured in position so that it will not be displaced during or after concreting if the filler is to remain permanently in the joint.

Wherever polystyrene or a similar material which is susceptible to damage is used to form joints, it shall be lined with a hard surface on the side to be concreted. The hard surface shall be sufficiently resilient to ensure that the joint and surfaces can be formed free from defects.

PS G 5.5.7.4.2 Sealing of Joints (New clause)

General

Sealed joints shall be made watertight over the full length of the joints, unless otherwise permitted by the Engineer, and the joint dimensions shall be as shown on the Drawings.

Preparation of joints

The reaming of joints by sawing or other means shall be undertaken when edge spalling or ravelling can be avoided and shall be subject to the Engineer's approval. After removal of the temporary filler material or the breaking-out of the excess concrete, the inside faces of the joint shall be wire-brushed or grit-blasted to removal all laitance and contaminants. Thereafter the joint shall be cleaned and blown out with compressed air to remove all traces of dust. Solvents shall not be used for removing contaminants from concrete and porous surfaces.

Care shall be taken to ensure that primers or adhesives are applied only to surfaces that are absolutely dry. The primer or adhesive shall be applied strictly in accordance with the manufacturer's instructions. Unless otherwise specified, the primer shall be applied within the temperature range of 10°C to 40°C and the sealant shall be applied after the curing period of the primer and within the period during which the primer remains active.

Sealants

Sealants shall be applied strictly in accordance with the manufacturer's instructions by a person skilled in the use of the particular type of sealant. The trapping of air and the formation of voids in the sealant shall be avoided. The sealant shall be finished to a neat appearance flush with the edges of the concrete or to the specified depth.

Thermoplastic hot-poured sealants shall not be poured into the joints when the temperature of the joint is below 10°C. The safe heating temperature shall not exceed the specified pouring temperature by more than 10°C.

Two-part thermosetting chemically curing sealants shall not be applied after expiry of the specified potlife period, which shall commence once the base and activator of the sealant have been combined.

PS G 5.5.7.4.3 Waterstops

Add new sub-clause G 5.5.7.4.3:

The waterstops shall be supplied in unjointed standard production lengths. Site jointing shall be limited to the absolute minimum. Where lengths in excess of the standard production lengths are required, such longer lengths shall preferably be factory jointed.

At intersections, transitions and abrupt changes of direction, factory-moulded watertight junction pieces shall be used so that any site jointing can be restricted to simple joints. When a waterstop with a centre bulb is intersected, the centre bulb shall be continuous throughout the intersection irrespective of the make-up of the intersection.

Plasticized, flexible PVC waterstops shall be manufactured from high-quality virgin material and shall not contain any scrap or reclaimed material. The waterstops shall be light coloured so as to reduce heat absorption when exposed to sunlight.

The waterstops shall be precision moulded or extruded to the required cross-sectional profile, they shall be free from porosity or other imperfections, and shall be provided with eyelets so that they can be securely fixed to prevent displacement during concreting.

All joints shall be butt-jointed hot-welded joints. Where joints cannot be factory made, Site joints shall be made in accordance with the manufacturer's instructions with equipment prescribed or supplied by the manufacturer and approved by the Engineer.

PS G 5.5.9 Adverse Weather Conditions (Subclause 5.5.9.1)

No material having a temperature of below 5 °C shall be used for concrete, and no concrete shall be deposited when the ground or air temperature is below 2 °C. Furthermore, if the air or ground temperature is likely to fall below 2 °C within 12 (twelve) hours after depositing of concrete, no concreting shall be done without the written consent of the Engineer. If such consent is given the Contractor shall heat the aggregate stockpiles and mixing water, and defrost the formwork and reinforcement.

PS G 5.5.10.1 Concrete Surfaces (Subclause 5.5.10.1)

Concrete surfaces under screeds, granolithic floor finishes or benching, and surfaces of strip foundations and footings shall be brought up to a plane, uniform surface with a suitable screed board.

PS G 5.5.10.4 Wood-Floated Finish

Add new sub-clause G 5.5.10.4:

Where wood floating is specified or scheduled, the surface shall first be given a finish as specified in G 5.5.10.1 and after the concrete has hardened sufficiently, it shall be floated to a uniform surface free from trowel marks. The screeded surface shall be wood-floated, either by hand or machine, only sufficiently to produce a uniform surface free from screed marks.

PS G 5.5.10.5 Steel-Floated Finish

Add new sub-clause G 5.5.10.5:

Where steel floating is specified or scheduled, the surface shall be treated as specified in PS G 5.5.10.1 except that, when the moisture film has disappeared and the concrete has hardened sufficiently to prevent laitance from being worked to the surface, the screeded surface shall be steel-trowelled under firm pressure to produce a dense, smooth, uniform surface free from trowel marks.

PS G 5.7 JOINING NEW CONCRETE TO EXISTING

Add new sub-clause G 5.7:

Fresh concrete shall be bonded to the old concrete with an approved type of epoxy bonding compound, such as Epidermix 344 or similar.

G 7 TESTING

PS G 7.1 WATER TIGHTNESS TEST

The water tightness test shall be carried out as follows.

The structure shall be filled to top water level with clean water and shall be allowed to remain filled for a period of seven days during which time any loss of water which may occur shall be made up by filling the structure to top water level. At the beginning of the test, the water level shall be recorded and the structure shall be left undisturbed for a period of not less than seven days. The structure shall be considered to be water tight if the drop in water level, excluding losses due to evaporation, does not exceed 20 mm in in seven days and no leakage or dampness is apparent.

G 8 MEASUREMENT AND PAYMENT

PSG 8.1.2.2 **Reinforcement** (Subclauses 8.1.2.2)

Notwithstanding the method of measuring and paying for reinforcement specified in Subclause 8.1.2.2, reinforcement will be measured and paid for as measured in the Bill of Quantities.

PS G8.1.2.3 **Reinforcement** (Subclauses 8.1.2.3)

Notwithstanding the method of measuring and paying for reinforcement specified in Subclause 8.1.2.3, reinforcement will be measured and paid for as measured in the Bill of Quantities.

PS G 8.1.3 **Concrete** (Subclause 8.1.3)

Delete “or the plan size of the excavation where additional excavation is provided to facilitate erection of forms” in the first sentence of sub-clause G 8.1.3.1(c).

Add the following to sub-clause G 8.1.3.1(d):

Strip foundations and encasement of pipes shall be cast directly against the sides and bottoms of excavations. No payment shall be made for additional concrete in over-break.

Delete the full stop at the end of sub-clause G 8.1.3.3(a) and add the following:

"and special steps necessary before depositing concrete during cold weather, as prescribed in PS G 5.5.9".

PS G 8.9 **WATER TIGHTNESS TEST**

The water tightness test will be paid by lump sum separately for each structure.

The sum shall cover the cost of all labour, equipment and materials required to carry out the test, as specified in PS G7-1, to rectify faults and to achieve the test results to the satisfaction of the Engineer. The sum shall also include the cost of water required except that required for one filling of the water retaining structure.

PS G 8.10 **Miscellaneous Items**

Add new payment clause G 8.10:

An item which, in the payment clause column of the Bill of Quantities, refers to this clause (PS A 8.10), will be measured in the unit scheduled in the Bill of Quantities. Where relevant, separate items will be scheduled for the fixed and time-related costs of the item.

The sum or rate for such an item shall cover the cost of all temporary works, materials, labour and plant required to execute and complete the work as specified, described in the Bill of Quantities or shown on the drawings.

SANS 1200 HA: STRUCTURAL STEEL: SUNDARY ITEMS

HA 5 CONSTRUCTION (EXECUTION OF WORK)

HA 5.7 COATING SYSTEM

Remove sub-clause HA 5.7 and replace with:

The coating system for all steel work not specified as Stainless Steel or Hot Dipped Galvanizing shall be as follows:

Surface preparation of steel as per subclause HA 5.4.

First Coat: Fabricators yard: Priming – To the clean steel, apply one coat of an approved red lead based primer to SABS 312, Type II, Grade II. The minimum dry film thickness shall be 40 microns.

Intermediate Coat – Apply one coat of an approved general purpose undercoat to give a minimum dry film thickness of 25 microns

Finishing – Two coats of an approved alkyd micaceous structural paint shall be applied. The dry film thickness shall not be less than 60 microns. The total dry film thickness for the three protective coats shall be not less than 125 microns. The colour of the paint shall be agreed with the Engineer prior to application.

HA 8 MEASUREMENT AND PAYMENT

HA8.3 SCHEDULED ITEMS

PS HA 8.3.7 Miscellaneous Items

Add new payment clause HA 8.3.7:

An item which, in the payment clause column of the Bill of Quantities, refers to this clause (PS A 8.10), will be measured in the unit scheduled in the Bill of Quantities. Where relevant, separate items will be scheduled for the fixed and time-related costs of the item.

The sum or rate for such an item shall cover the cost of all temporary works, materials, labour and plant required to execute and complete the work as specified, described in the Bill of Quantities or shown on the drawings.

PS HA 8.3.8 A-Frame Gantry Crane

Add new payment clause HA 8.3.8:

This rate shall include the procurement, transportation