TRANSNET PIPELINES

WALTLOO DEPOT

SPILL BASIN PROJECT

PROJECT SPECIFICATION – CIVIL AND STRUCTURAL WORKS

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PSA GENERAL (SANS 1200 A)

PSA 1 Contractual Requirements (Subclause 8.3.1 and 8.4.1)

PSA 1.1 Payment for unused materials

Not applicable to this contract.

PSA 1.3 Time Related Items (Subclause 8.2.2)

Notwithstanding the provisions of Subclause 8.2.2 of SANS 1200 A and Clause 45(4) of the General Conditions of Contract, and extension of time granted in terms of Clause 45(3)(b) of the General Conditions of Contract will not qualify the Contractor to receive the payment of additional time related costs.

PSB APPLICABLE STANDARDISED AND PARTICULAR SPECIFICATIONS

Although not bound in nor issued with this document, the following standardised specifications shall from part of the contract document and, not withstanding the provisions of Subclause 2.2 of SANS 1200 A, editions specified below shall apply:-

SANS	1200 AA	1986	General
SANS	1200 AB	1986	Engineers office
SANS	1200 C		Site Clearance
SANS	1200 DA	1982	Earthworks (small works)
SANS	1200 DB	1989	Earthworks (pipe trenches)
SANS	1200 G	1982	Concrete (structural)
SANS	1200 GE	1984	Structural Precast Concrete
SANS	1200 H		Structural Steelwork
SANS	1200 HA		Structural Steelworks (Small Works)
SANS	1200 HC		Corrosion Protection of Structural Steelwork
SANS	1200 L	1983	Medium pressure pipelines
SANS	1200 LB	1983	Bedding (Pipes)
SANS	1200 LC	1981	Cable ducts
SANS	1200 LE	1981	Stormwater drainage
SANS	1200 M	1981	Road (general)
SANS	1200 ME	1981	Sub-base
SANS	064		Preparation of steel surfaces for coating
SANS	135		Isometric black bolts, screws, nuts (hexagon)
SANS	136		ISO metric precision hexagon headbolts, screws, and nuts (coarse thread medium fit series
SANS	763		Hot-Dip galvanized Zinc Coatings
SANS	926		Two pack zinc-rich epoxy primer
SANS	1431		Weldable Structural Steels

PSC SITE CLEARANCE (SANS 1200 C)

PSC 1 Method of Measurement (Subclause 8.2.8)

Notwithstanding the provisions of subclause 8.2.8 of SANS 1200 C, demolition of various structures will be measured and paid for in accordance with the items in the schedule of quantities.

Volumes will be computed according to the net dimensions of the elements to be demolished with no allowance being made for bulking. The cost of removal of demolition rubble off site to waste shall be included in the rates for demolition.

PSC 2 Ownership of Demolished Materials

Where identified items are to be demolished or dismantled and stockpiled on site, the items shall remain the property of the Employer and may be re-used in the permanent Works.

Where items are to be demolished or dismantled and removed off site, the items shall become the property of the Contractor.

PSDA EARTHWORKS (Small Works) (SANS 1200 DA)

PSDA 1 Classification (Subclause 3.1)

Notwithstanding the provisions of subclause 3.1 of SANS 1200 DA, the material excavated will not be classified for purposes of measurement and payment. The rate for excavation shall cover excavation in all materials with no extra over rate for hard excavation.

Excavations are to be done with a bladed bucket to ensure that the existing material below structure and layer works is not disturbed. Tined buckets will not be allowed.

Excavations for bund areas will be restricted due to existing pipework and structures. It will be a requirement that excavations and removal of the excavated material from the bunds will be done by hand or small equipment such as a Bobcat (or similar). All equipment proposed to be used must be approved by the Engineer and client.

All contaminated materials to be treated as per PSO and then disposed off site.

PSDA 2 Excavation

PSDA 2.1 Excavation (Subclause 8.3.1 and 8.3.2)

Notwithstanding the provisions of subclause 8.3.1 and 8.3.2 of SANS 1200 DA, no overhaul will be measured for excavation to waste.

PSDA 2.2 Restricted Excavation (Subclause 8.3.2)

Notwithstanding the provision of subclause 8.3., the contractor shall excavate to provide working space for the formwork for concrete and shall include for this in his tendered rates.

PSDA 2.3 Existing Services (Subclause 8.3.5)

Attention is drawn to PS 8.1 regarding payment for excavations affected by existing services.

PSDB EARTHWORKS (Pipe Trenches)

PSDB 1 Classification (Subclause 3.1)

Notwithstanding the provisions of subclause 3.1 of SANS 1200 DB, the materials excavated will not be classified for purposes of measurement and payment. The rate for excavation shall cover excavation in all materials with an extra over rate for excavating in areas of soil improvement.

Excavations in bund areas will be restricted due to existing pipework and structures. It will be a requirement that excavations and removal of the excavated material from the bunds will be done by hand or small equipment such as a Bobcat (or similar). All equipment proposed to be used must be approved by the Engineer and client.

All contaminated materials to be treated as per PSO and then disposed off site.

PSDB 2 Materials

Backfill Materials..(Subclause 3.5)

Add the following:

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

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

Add the following:

"(c) Cement-stabilised backfilling

Backfilling shall be stabilised with 5 % cement where directed by the Engineer. The aggregate shall consist of approved soil or gravel containing stones not bigger than 38 mm and with a plasticity index not exceeding 10.

The soil or gravel shall be mixed with 5 % cement and shall compacted in layers of 100 mm thick to 90 % of modified AASHTO density.

PSDB 3 Plant

Excavation equipment (Subclause 4.1)

Add the following:

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

PSDB 4 Construction

Trench bottom (Subclause 5.5)

Substitute "90%" *in the second paragraph of DB 5.5 with* "93% (100% for sand)".

PSDB 5 Backfilling

Disposal of soft excavation material (Subclause 5.6.3)

Replace the contents of this item with the following:

"Excavation material from the trench, which is unsuitable or has become surplus because of bulking, displacement by the pipe and importation, shall be disposed of at no additional cost."

PSDB 6 Compaction

Areas subject to traffic loads (Subclause 5.7.2)

Add the following:

"All pipe trenches that fall under the road pavement layers will be regarded as areas subject to traffic loads.

Sand backfilling shall be compacted to 100% of Mod AASHTO density."

PSDB 7 Measurements and Payment

Computation of quantities

Excavation (Subclause 8.1.4)

Notwithstanding the provisions of subclause 8.1.4 of SANS 1200 DA, no overhaul will be measured for excavation to waste.

Trench Widths

Where trench excavation widths are specified in the schedule of quantities, these are calculated from the pipe diameters and spacing of pipes as shown on the drawings plus the side allowance for each of the outer pipes in accordance with SANS 1200 DB 8.2.3.

Shoring (Subclause 8.2.4)

Add the following:

"No payment will be made in respect of this and all costs will be deemed as covered by the rate for excavation."

PSDB 8 Scheduled Items

Excavation (Subclause 8.3.2 a)

Add the following:
"No payment will be made in respect of any benching required on steep slopes to allow for excavation of trenches."

Existing Services (Subclause 8.3.5)

Attention is drawn to PS 8.1 regarding payment for excavations affected by existing services.

PSDB 5 Reinstatement of Trenches (Subclause 8.3.6)

Workmanship and materials required in the reinstatement of trenches shall comply in all respects with the requirements of the appropriate sub-sections of SANS 1200 M.

Reinstatement of concrete roadways shall comprise:-

a) 150mm slab of 35MPa/19mm concrete, wood floated, with and including mesh Ref. 395

b) 150mm cement stabilised sub-base having a strength of 3 to 6MPa.

c) 150mm unstabilized sub-base.

d) A 30 x 6mm rebate shall be formed between the old and new concrete and sealed with Colpor 200 or equivalent approved.

PSDM CONSTRUCTION

PSDM 1 Treatment of road bed (Subclause 5.2.3.3)

(a) Preparation and compaction of road bed.

Substitute the first paragraph of DM 5.2.3.3 (a) with the following:

"The Contractor's attention is drawn to the requirements in the Geotechnical Report regarding the treatment of the road bed.

The road bed shall be excavated using plant that shall not use tined buckets. The road bed shall not be ripped and compacted and shall not be rolled, but shall be rolled by means of a 3 pass 10 ton static roller after excavation and the required shaping. The lower selected layer shall be placed by means of end tipping and the exposed road bed shall **not** be trafficked."

PSDM 2 Fill

Placing and compaction (Subclause 5.2.4.2)

Add the following:

"(f) Placing fill on unstable material

The Engineer may direct that a pioneer layer be constructed due to presence of unsuitable material / or that such unsuitable material be removed and replaced with fill material.

The pioneer layer shall be constructed by dumping and spreading successive loads of suitable coarse material in a uniform layer of thickness just sufficient to provide a stable working platform for the construction of further fill layers. Light hauling equipment and, where necessary, end tipping shall be used to place the material, and the layer shall be compacted by the use of light compaction equipment that will

give the most effective compaction without overstressing the road-bed. A pioneer layer will not require compaction to a controlled density."

PSG **CONCRETE (Structural) (SANS 1200 G)**

PSG 1 Concrete (Subclause 5.5)

The use of ready mixed concrete is required for this project. The contractor shall prepare concrete cubes and test them in accordance with clause 7 of SANS 1200 G. One test set will consist of 6 cubes of which 3 will be crushed at 28 days.

Degree of accuracy II shall apply.

PSG 2 Reinforcement (Subclause 8.1.2)

Notwithstanding the provision of subclause 8.1.2 of SANS 1200 G, reinforcement will be measured and paid for by mass regardless of the diameters of the reinforcing bars.

PSG 3 Mesh Reinforcement (Subclause 8.3.2)

Notwithstanding the provision of subclause 8.3.2 of SANS 1200 G, mesh reinforcement will be measured and paid for by metres square based on the net area of mesh placed, regardless of type reference, with no allowance being made for cutting to suit, waste, laps or deductions for end cover.

PSG 4 Formwork (Subclause 8.1.1)

All exposed concrete corners shall have a 25mm x 25mm chamfer. The unit rates tendered for formwork shall include for the provision of such chamfers.

Degree of accuracy II shall apply.

PSG 5 Concrete Paving

The concrete includes the laying of fibre reinforced concrete paving with expansion joints and saw cut contraction joints. The contraction joints shall be saw cut with a diamond tipped cutting blade between 12 and 24 hours after placing of the concrete.

Edge formwork shall be firmly fixed to line and level, the base course shall be wetted and between these edges the concrete shall be evenly brought up to within 50mm of the finished level. At this stage, the necessary mesh reinforcement shall be placed after which concreting to finished levels shall resume. Compaction of the concrete shall be by air driven poker vibrator units but special care shall be taken to ensure that the poker units do not damage the underlying base course.
The finished concrete surface shall be wood trowelled.

Curing of the concrete shall be as specified in clause 5.5.8(e) using a resin based curing compound applied in accordance with the manufacturers recommendations. It shall be applied immediately after the concrete has received its finish.

No cracked concrete will be accepted and it will be required that cracked panels be replaced.

PSG 6 Formwork and Unformed Finishes

The surfaces of concrete slabs shall be finished so that all ponding of surface water is eliminated.

PSG 7 Joint Sealing

Joints shall be sealed as detailed on the drawings using ABE Durakol G HM sealant (or similar approved). The sealant shall be applied strictly in accordance with the manufacturer's recommendations. In particular the Contractor shall observe the specific requirements relating to joint preparation, priming and sealant mixing. It should be noted that the moisture content of the concrete prior to the application of the primer should not exceed 5%.

PSG 8 HDPE/Plastic Sheeting

On top of the sand bedding layer a high density polyethylene sheeting 1,0mm thick and seal welded. The plastic sheeting shall be of a type highly resistant to swelling and/or degradation when in contact with hydrocarbons, such as Hi-Driline NF 1000 by Aquatan, or equal approved.
At walls and other structures the ends of the plastic sheeting shall be sealed against the structure or wall as detailed on the drawings.
Due care and attention shall be taken in all operations to ensure that the liner is not damaged.
Payment will be per square metre for the nett area covered by the sheeting.

PSH STRUCTURAL STEELWORK (SANS 1200 H)

PSH 1 Material

Steel shall be mild steel to SANS 1431 – Grade 350 WA.

PSH 2 Alternative Sections

Alternative sections will be accepted (after consultation with the Engineer), to suit available supplies, provided there is no loss of strength or stiffness or, where relevant, appearance.

PSH 3 Drawings and Shop Details (Sub-clause 5.1.2)

The Contractor shall provide shop details and shall allow for all costs associated with the provision of drawings as specified in his tendered rates.

Two prints of all shop drawings shall be submitted to the engineer for approval before fabrication of that part of the work is commenced. The Engineer undertakes to respond to such requests for approval within two working days.

PSH 4 Welding

All welding shall be fully continuous fillet. Minimum weld size is 6mm. All welding to be in accordance with SANS 044 and SANS 455. All welding to be done prior to protection of steelwork.

PSH 5 Erection Bolts

All erection bolts used to be manufactured to SANS 136. Bolt Grade 8.8 to be used. All bolts shall be of hot dipped galvanised manufacture and shall be provided with galvanised washers below heads and nuts of bolts. Erection bolts shall be ISO metric threaded

PSH 6 Payment

Notwithstanding the various payment clauses contained in Clause 8.3, payment shall be as stated in the Schedule of Quantities and shall include for supply, fabrication, corrosion protection, delivery to site, erection including all fixings and grouting of baseplates.

PSH 7 Connections

As far as practically possible, connections are to be bolted so as to minimise the amount of site welding required. Bolted connections to receive a minimum of 2 M20 bolts, unless otherwise specified. Details of any splices to be submitted to the Engineer for approval prior to erection. All bolts to be fitted with hot dipped galvanised washers below nuts and bolt heads.

All costs for splice details are for the Contractors account.

PSH 8 Open Mesh Flooring and Frames

Open mesh flooring shall be banded all round its edges and at any cutouts for pipes etc. Flooring shall be hot dip galvanised to Table 2 of SABS 763 for heavy duty applications.

PSHC CORROSION PROTECTION OF STRUCTURAL STEELWORK (SANS 1200 HC)

PSHC 1 Structural Steelwork

PSHC 1.1 Surface Preparation (Sub-clause 5.4.3.1)

All surfaces shall be abrasive blast cleaned to Swedish standard SIS 055900 of 1967 to SA 2½. The blast profile shall be between 40 and 75 microns.

PSHC 1.2 Coating System (Sub-clause 5.7)

All structural steel to be hot dipped galvanized according to SANS 121:2011 (ISO 1461:2009). All galvanised sections shall be straight and without any twist when delivered to site

All structural steel that requires painting shall be hot dip galvanised and coated with a Duplex paint system consisting of:

a) Clean with galvkleen
b) One coat of epoxy type primer to a DFT of 35 microns
c) One coat Aliphatic Polyurethane to a DFT of 125microns

Note : the primer shall be a different colour to the final coat to allow for easy identification. All colours shall be to H&R specification and the contractor shall establish the applicable colour prior to coating if there is any uncertainty.

After erection any abrasions to paintwork shall be repaired in accordance with the manufacturer's instructions. The protruding heads of all nuts and bolts shall be degreased and coated as per (a) – (c) above. The costs of performing all of the above shall be included in the tendered rates.

Intermediate and final paint DFT tests shall be carried out in accordance with the manufacturers specifications.

PSHC 2 Handrails

All handrails shall be hot dip galvanised and coated with a Duplex paint system consisting of :

a) Clean with galvkleen
b) One coat of epoxy type primer to a DFT of 35 microns
c) One coat Aliphatic Polyurethane to a DFT of 125microns

Stanchions and the bottom knee rail shall be painted black and the top handrail golden yellow.

PSHC 3 Open mesh flooring, handrails and catchpit covers

Open mesh flooring, handrails and the seating angles cast into the concrete shall be hot dip galvanised to Table 1 of SANS 763 for general applications.

PSHC 4 Holding down bolts, nuts and washers

All holding down bolts, nuts and washers shall be at least hot dip galvanised with the threads sufficiently undercut prior to galvanising. Washers shall be provided with every nut. All sleeve anchors shall be galvanised. An approved molybdenum disulphide anti-seize compound shall be used on all bolts and nuts.

PSLB BEDDING (Pipes)

PSLB 1 Definitions

Stone Mat

Only materials that comply with the requirements of Clause PSLB 3.5 may be used.

PSLB 2 Materials

PSLB 2.1 Selected Granular Material

It is not expected that all selected granular fill material for the bedding of pipes will be obtainable from excavations.

PSLB 2.2 Selected Fill Material (Clause 3.2)

Selected fill material shall be material that has a PI not exceeding 10 and that is free from vegetation and from lumps and stone of diameter exceeding 30mm.

PSLB 2.3 Stone Mat

The stone mat shall be 13,2mm or 19mm (as in the schedule of quantities) nominal size crushed stone for concrete complying with the requirements of SANS 1083 (Category 2).

PSLB 2.4 Bedding and Selected Granular fill for Subsoil drains

a) Bedding for subsoil drains

Bedding for subsoil drains shall be 13,2mm nominal size crushed stone for concrete complying with the requirements of SANS 1083. It shall be placed 50mm thick under the pipes and to provide a cover of 150mm over the pipes, and shall be fully wrapped in a geofabric Grade C.

c) Selected granular fill for subsoil drains

Selected granular fill for subsoil drains shall be a singularly graded river sand or washed beach sand with a permeability of not less than 1×10^{-3}cm/second measured under constant head on the material compacted to visual optimum density. The Contractor shall provide the results of permeability tests to the Engineer at the rate of one test of every $100m^3$ of material placed.

PSLB 3 Measurement and Payment

PSLB 3.1 Materials displaced by importation of material in terms of 8.1.2 shall be disposed off site at approved dumpsites. No overhaul will be paid on such material.

Excavations in bund areas will be restricted due to existing pipework and structures. It will be a requirement that excavations and removal of the excavated material from the bunds will be done by hand or small equipment such as a Bobcat (or similar). All equipment proposed to be used must be approved by the Engineer and client.

All contaminated materials to be treated as per PSO and then disposed off site.

PSLB 3.2 The free haul distance shall be 1km for the selected fill material obtained from excavations.

The rate for selected granular materials from a commercial source shall allow for transportation over an unlimited free haul distance from the source to its final position in the works.

PSLE STORMWATER DRAINAGE (SANS 1200 LE)

PSLE 1 Materials

PSLE 1.1 Culvert Units and Pipes

a) Precast concrete pipes

Precast concrete pipes shall comply with the applicable requirements for SC type pipes of SANS 677. The pipes shall be of the spigot and socket type jointed with nitrile sealing rings.

b) Skewed ends

Skewed ends to pipe culverts may be cut on site provided the cut is neatly made with a power driven ceramic cutting wheel or similar cutting device. Cutting by means of a cold chisel and hammer will not be permitted.

c) Subsoil drainage pipes

Subsoil drainage pipes shall be either:

i) perforated HDPE pipes and couplings to Type 5 SANS 533 Part II of 1982.

ii) plastic land drainage pipes of 100mm nominal internal diameter to SANS 791, with longitudinal slots.

PSLE 1.2 Bricks

Common bricks of 14MPa strength will be acceptable.

PSLE 1.3 Manhole Covers, Grid Inlets, etc

Where shown on the drawings or required by the Engineer, manhole covers and frames shall be precast concrete covers and frames as detailed on the drawings.

PSLE 1.4 Geofabric Blanket

Three grades of filter fabric may be required as follows:-

GRADE	MASS PER UNIT SURFACE G/m^2 (SANS)	PERMEABILITY UNDER 2kPA m/s	ONE DIRECTIONAL TENSILE STRENGTH kn/m (SANS 93)
A	140	3 X 10 $^{-3}$	6
B	250	3 X 10 $^{-3}$	14
C	320	3 X 10 $^{-3}$	19

The rate shall provide for the supply and laying of the geofabric blanket during selective backfill operations and shall include for cutting, stitching and waste.

PSME SUB-BASE (SANS 1200 ME)

PSME 1 Materials

PSME 1.1 Physical Properties

PSME 1.1.1 Sub-base material

The material placed in the sub-base (stabilised and unstabilised) shall be of a G7 quality as per SANS 1200 M specification:-
Stabilised subbase shall conform to a C3 specification.

PSME 2 Selection

PSME 2.1 General Selection

During construction, should the physical properties of the material appear to differ appreciably from the properties of the material previously approved, the Contractor shall obtain the Engineers approval prior to processing the material. If the Engineer does not give his approval, the material shall be removed from site and replaced with suitable material at the Contractors cost.

PSME 3 Construction

PSME 3.1 Processing

a) Screening

Screening of the material through a screening plant will be permitted.

PSME 4 Placing and Compaction

PSME 4.1 Placing

Before the construction of the sub-base and gravel shoulders is commenced, the Contractor shall ensure that the underlying subgrade and selected layer, if any, comply with the relevant requirements of SANS 1200 DM.
The Contractor may use whatever technique he chooses to achieve the specified standards for sub-base and shoulder but in selecting his technique, should bear in mind the limited widths of road and shoulder.

PSME 4.2 Compaction

The sub-base shall be compacted to a density of at least 97% of MOD AASHTO density.

PSME 5 Stabilisation

PSME 5.1 Rate of Application

The rate of application of stabilisation agent if required will be determined on site by the Engineer after testing the material stockpiled for use in the sub-base.

PSME 6 Transport

PSME 6.1 Freehaul

All haulage of sub-base material shall be regarded as freehaul.

PSME 7 Tolerances

PSME 7.1 Cross Sections

The level of the surface of the shoulder adjacent to the road surfacing shall be within the following tolerances relative to the adjacent road surface : 5mm + 10mm.

PSME 8. Stabilisation

PSME 8.1 Acceptance control of stabiliser per area cast

The efficiency of spreading and mixing shall be measured by taking samples from the upper and lower portions of the layer from nine positions on a uniform grid over the full length and width of the layer to provide 18 samples over the length selected. These samples shall then be tested by method A15(d) of TMH1 (Standards methods of Testing Road Construction Materials) to determine cement or lime contents, by a recognised testing laboratory.

The tests on these samples shall show stabiliser contents within the following limitations:-

a) No sample shall show a stabiliser content of less than 75% nor more than 125% of the specified amount.

b) The average stabiliser content of all 18 samples shall not be less than 95% nor more than 110% of the specified amount.

PSN **DAYWORKS/SITE INSTRUCTIONS**

Dayworks may be required from time to time. All daywork sheets, inclusive of labour and materials are to be submitted to the Engineer within 48 hours of completing the task. Sheets submitted after this period will not be considered. The same applies to site instructions which carry a cost implication due to new rates or on current billed rates.

A daily site diary is to be submitted to the Engineer at the start of each day, for the previous days activities, personnel and plant on site. Failure to submit such diary will bind the Contractor to accept the Engineers diary. All work not on the drawings is to be done on a written site instruction. The Contractor is to ensure that he is provided with site instructions for all work performed that is not shown on the drawings.