



STRATEGIC ASSET MANAGEMENT

TECHNICAL SPECIFICATION

SECTION: Design Office Civil

Project No.

P.04389

Contract Number

RW01368/17

H39 PHASE 2 PIPELINE ADDITIONAL WORKS.

CIVIL TECHNICAL SPECIFICATION

Validation Status (Draft, Review, Approval, Construction)

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1. PROJECT SCOPE AND GENERAL SPECIFICATIONS

BACKGROUND

The works consist of earthworks, construction of chambers and associated civil works for 5500m of 1700mm internal diameter steel pipeline with a wall thickness of 16mm (H39 Pipeline Phase 2) laid from the intersection of Dale Road and Modderfontein Road in Midrand to the Randjesfontein Estate in Midrand, 300m of pipe jacking of 2000mm ID concrete pipe sleeve, and reconstruction of Hampton Road and Milner Road in Glen Austin, Midrand while complying to the applicable SABS 1200 specifications, variations and additions to the standardized specifications applicable to this contract and the technical specifications of Rand Water for work that falls outside of the standardized specifications.

Analysis of the existing system shows that the existing 1700mm diameter 14.7 km long H27 pipeline between the end of the 3000mm diameter Klipfontein reservoir deep outlet and Graham Street in Midrand, exceeds a velocity of 2.5m/s from about 2016 on a regular basis. H39 pipeline has now been constructed as a duplicate pipeline to the existing H27 pipeline.

The construction of the H39 pipeline is complete, however, some minor additional works are required for the project to be handed over to the client, those include, the installation of a new scouring system (scour valve, scour pipeline and construction of scour outlet chamber), installation of steel access platforms in four (4) number of end connection chambers, construction of mass concrete access steps on air valve chamber 1 and 2, and the construction of earth berm to protect surrounding properties from the newly constructed scour outlet chamber.

1.1. CIVIL/STRUCTURAL SPECIFICATIONS

GENERAL NOTE:

THIS SPECIFICATION DOCUMENT SHALL BE READ IN CONJUNCTION WITH OTHER PROJECT SPECIFICATIONS.

1.1.1. TERMINOLOGY, ABBREVIATIONS AND APPLICABLE DRAWINGS

The following terminology shall apply:

Term	Definition
Engineer	As defined in the commercial document.
Employer	Shall mean the same as the “client”, with the client being the owner of the project
Contractor	Shall mean the legal entity under the employ of the Client who enters into a binding Contract to undertake part of or the entirety of the Works described in this and other Contract documents.

The following abbreviations shall apply:

Abbreviation	Definition
GA	General Arrangement
SANS	South African National Standards
SABS	South African Bureau of Standards

This document shall be read in conjunction with the following project drawings:

Drawing Number	Drawing Title
R026991/800	GENERAL ARRANGEMENTS FOR THE STORM WATER BERM AND PRECAST SCOUR OUTLET CHAMBER.
R026991/900	GENERAL ARRANGEMENTS OF STEEL PLATFORMS FOR END-CONNECTION CHAMBER No. 1 AND 2
R026991/901	GENERAL ARRANGEMENTS OF STEEL PLATFORMS FOR END-CONNECTION CHAMBER No. 3 AND 4
RA26991/20/02	1x150mm DIA AIR VALVE CHAMBER IN THE CH 4800 AIR VALVE MODIFICATION
RA26991/20/01	AIR VALVE MODIFICATION AT CHAINAGE 4800 PIPELINE LAYOUT
RA26691/19/01	SCOUR AT CHAINAGE 750 STORMWATER BERM AND RID INLET

This document shall be read in conjunction with the following standard drawings:

Drawing Number	Drawing Title
11860	MANHOLE COVER AND FRAME
A8879	DETAILS FOR CAST IN FRAME FOR SUMP
A12210	TYPICAL VALVE SUPPORT DETAILS
A7406	WALL MOUNTED CATLADDER
A9858	GRAB RAIL
RA27329	MASS CONCRETE ACCESS STEPS

1.1.2. General Requirements

Civil and Structural works are to be carried out as per the requirements of the SANS 2001 "Construction Works Standards" and SANS 1200 "The Standardized Specification for Civil Engineering Construction".

1.1.3. Service Water Supply

Connection points (water source)

The position of the potable water connections will be pointed out to the contractor on site, by the client or the client's representatives.

The operating pressure for the existing connection point, are to be confirmed by the Contractor.

The Contractor shall make allowance for installing a water meter connection on the water connection point. Water for construction shall be to the Contractor's account and shall be deemed to be included in the tendered rates.

1.1.4. The detailed scope of works for the project, to be effected by the contractor, are as follows:

The Contractor's obligations under this project shall include, but not be limited to the following principal items (where omissions are identified, the tendering contractor should notify the Engineer):

- 1.1.4.1. Provide a construction methodology to be approved by the Engineer;
- 1.1.4.2. Fencing off around designated site areas;
- 1.1.4.3. Verification of service detection (including detecting the location and depth of services);
- 1.1.4.4. Re-routing (where required) and protection of existing services;
- 1.1.4.5. Setting out the benchmarks and levels verification;
- 1.1.4.6. Removal of topsoil and stockpiling for later re-instatement;

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- 1.1.4.7. Excavation for the precast scour outlet chambers, disposing of spoil material and preparation of layerworks;
- 1.1.4.8. Temporary works design and erection, as part of formwork and shoring;
- 1.1.4.9. Construction of the precast concrete valve chambers with cast in-situ base slabs;
- 1.1.4.10. Application of waterproofing membrane on the outer face chamber walls;
- 1.1.4.11. Backfilling and compaction around the valve chamber;
- 1.1.4.12. Construction of reno mattress layer;
- 1.1.4.13. Construction of mass concrete access steps (on 3 No. of chambers, 1 scour outlet chamber and 2 No. of air valve chambers)
- 1.1.4.14. Construction of earth berm;
- 1.1.4.15. Supply and install steel sundry items (including steel access platform in 4 no. of end connections);
- 1.1.4.16. Generation of As-built drawings;
- 1.1.4.17. Reinstatement of structures damaged or relocated during construction to their preconstruction condition/location and making good of site;
- 1.1.4.18. Rectification of all defects identified during the Defects Liability Period;
- 1.1.4.19. Pipeline Specials Scope of work (refer to DRG No.: RA26991/20/02)
- Dismantle the air valve (Item No.1)
 - Procure, supply, manufacture, and install pipe specials (Item No. 4, 7, 8 & 9)
 - Re install Item No. 1
- 1.1.4.20. Pipeline Laying (refer to DRG No.: RO26991/20/1)
- Supply 200 mm dia uPVC pipe, class 16 with a fully end load resistant coupling system.
 - Excavate, Bed, Lay and backfill (complete installation)
 - Test and disinfect the pipe.
- 1.1.4.21. Start and end connections.
- This activity includes making the necessary openings on the chamber and the required sealing of the opening
- Tie – in the 200mm dia uPVC pipe to Item 9 of DRG No. RA26991/20/02
 - Tie – in the 200mm dia uPVC pipe to the scour wet well (refer to DRG No.: RA26991/800)

1.1.5. VARIATIONS AND ADDITIONS TO STANDARDIZED SPECIFICATIONS

The variations and additions to the applicable standardized specifications have been compiled to provide supplemental site and project specific information to SANS 1200; SANS 10120; SANS 2001 and the Technical Specifications contained in this document.

In addition to the below tabulated applicable specification standards to the project, variations and additions are provided below:

Specification No.	Description
SANS 1200 - A	Standardized Specification for Civil Engineering Construction – General
SANS 1200 - D	Standardized Specification for Civil Engineering Construction – Earthworks
SANS 2001 – BE1	Construction Works – Earthworks (General)
SANS 2001 – BS1	Construction Works – Site Clearance
SANS 2001 – CC1	Construction Works – Concrete Works (Structural)
SANS 2001 – CS1	Construction Works – Structural Steelwork
SANS 2001 – DP1	Earthworks for Buried Pipelines and Prefabricated Culverts

A GENERAL - (SABS1200AA – 1986)

A 3 MATERIALS

A 3.1 QUALITY AND SAMPLES

Substitute the second sentence of the first paragraph of “A3.1” with the following:

“Materials shall bear the official mark of the appropriate standard.”

Also add the following as a second paragraph:

“The Contractor is responsible for the cost of all testing to ascertain that all construction materials comply with the relevant minimum requirements, and all costs associated with testing of the materials shall be deemed to be included in the tendered rates. Samples on which control testing is required by the Engineer, shall be delivered free of charge to an approved laboratory. 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/site inspections to be done at least 48 hours before such tests/inspections are required, and the contractor must allow in his/her programme for the time necessary for the tests/inspections be undertaken, 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.

All materials shall comply with the SANS applicable to them.”

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 a lack of materials on site, by placing orders with suppliers for the required materials timeously.”

A 4 PLANT

A 4.1 CONTRACTOR'S OFFICE, STORES AND SERVICES

Add the following to “A 4.2”:

“Security of the Contractor’s camp and construction site will be the Contractor’s own responsibility and no additional payment will be made if additional security measures (crime prevention, etc.) need to be employed during the contract period.

The Contractor shall make his own arrangements for housing his employees and transporting them to and from the site – such housing, shall however; meet the relevant requirements for temporary housing. The Contractor is responsible in all respects for the housing and transporting of his employees and for the arrangement thereof, and no extension of time due to any delays resulting from this will be granted.”

A 4.3 HAND TOOLS

Add new sub-clause “A 4.3”:

“The Contractor shall provide and maintain all hand tools required for the execution of the Works and all such costs shall be deemed to be included in the tendered rates and no separate payment will be made for it.”

A 4.4 MEDICAL FACILITIES AND SAFETY EQUIPMENT

Add new sub-clause “A 4.4”:

“The Contractor shall provide a First Aid cabinet fully equipped and maintained with the minimum contents as listed in the Annexure (Regulation 3) to the General Safety Regulations of the Occupational Health and Safety Act (Act 85 of 1993), to deal with accidents and ailments which are likely to occur during the construction period.

The Contractor shall provide personal safety equipment and facilities as required by Regulation 2 of the General Safety Regulations of the Occupational Health and Safety Act (Act 85 of 1993).

The Contractor shall designate his Safety Officer and Qualified First Aider. The Contractor shall give copies of the minutes of the site safety meetings to the Engineer.”

A 5 CONSTRUCTION

A5.1 SURVEY

A 5.1.2 Preservation and Replacement of Beacons and Pegs Subject to the Land Survey Act

Add the following paragraph at the end of sub clause “A 5.1.2”:

“Before the commencement of construction work, the Contractor, in consultation and liaison with the Engineer, shall search for plot pegs where boundaries have not been established by the erection of walls or fences (e.g. between two adjacent undeveloped erven or on an undeveloped corner erf) and the Contractor shall compile a list of such pegs that are apparently in their correct positions. Where pegs are not in their correct positions this should be noted by the Contractor and the Engineer should be notified immediately”.

A 5.2 WATCHING, BARRICADING, LIGHTING AND TRAFFIC CROSSINGS

Clause A 5.2 is superseded by a more stringent clause BE1-6 "Safety" of SANS 2001-BE1:2008

A 5.4 PROTECTION OF OVERHEAD AND UNDERGROUND SERVICES

Add the following to "A 5.4":

"It can be expected that existing services will be encountered during the course of construction. The Contractor must determine as far as is possible in conjunction with the relevant authorities the location of the various services. Special care must be taken to avoid disrupting these services. The cost of locating and protecting the services shall be deemed to have been included in the rates. All services must be detected and exposed by hand excavation, or other suitable means before any bulk excavation may start."

A 5.5 DEALING WITH WATER ON WORKS

Add the following to the end of "A 5.5":

"Dedicated dewatering measures must be provided for in the event of a high/perched water table.

Over and above his general obligations in regard to dealing with water as specified in SANS 1200 A, the Contractor shall deal with and dispose of all water so as to ensure that the Works are kept sufficiently dry at all times so that they can be properly executed, and he shall protect them against flood damage. For this purpose, the Contractor shall provide sufficient pumps, pipes and other equipment that may be necessary. Payment for dealing with water shall be included in the Contractor's rates for foundations, except in so far as special provision for dealing with water may be made elsewhere in the Specifications, the contractor shall also ensure that they have enough spares to ensure uninterrupted dewatering of bulk excavations"

A 5.6 POLLUTION

Replace "A 5.6" with the following:

"The Contractor shall take all reasonable measures to minimize any dust nuisance, pollution of streams and inconvenience to or interference with the public (or others) or machinery as a result of the execution of the Works (including excessive vibration of machinery caused by construction equipment)."

A5.8 GROUND AND ACCESS TO WORKS

Add the following to "A 5.8":

"The Contractor shall maintain adequate access to all public and private property at all times unless otherwise sanctioned by the Engineer. Details of the proposed methods of providing access shall be submitted to the Engineer for approval before such access is restricted. Any claims arising from impeded accesses shall wholly be the responsibility of the Contractor.

Construction along existing roads should be executed in such a manner that both pedestrian and vehicular traffic can be accommodated at all times.

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.”

A 7 TESTING

A 7.1 PRINCIPLES

Add the following to the end “A 7.1.1”:

“The Contractor is expected to anticipate any tests which may be reasonably requested by the Engineer which are not included in the technical specifications or bills of quantities. The rates for the tests and all costs thereof shall be deemed to be included in the contractor’s tendered rates.”

A 7.4 STATISTICAL ANALYSIS OF CONTROL TESTS

Add sub-clause “A 7.4” as follows:

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

A 7.5 PROCESS CONTROL

Add new sub-clause “A 7.5”:

“All test results obtained by the Contractor in the course of his process control 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 which will be provided by the Engineer – any request for inspection shall be sent to the Engineer at least 48 hours before the intended completion date of the works.

The Contractor shall make suitable arrangements for process control prior to commencement with the Works. Should the Contractor intend using site personnel for this purpose, the Contractor shall ensure that suitably trained and competent personnel take charge of the necessary test work, and that the necessary equipment is at their disposal prior to commencement of the Works. Failure to comply with these requirements shall be just cause for the Engineer to order suspension of the works without additional remuneration or for the Engineer to recommend termination to the Employer.”

BE1 EARTHWORKS - (SUPPLEMENT TO SANS 2001-BE1: 2008)

The following specification is drawn up with SANS 2001-BE1:2008 as a basis, supplemented by the specific sections of SANS 1200-D.

BE1 - 4 REQUIREMENTS

BE1 - 4.1 MATERIALS

BE1 - 4.1.6 Contamination of Suitable Fill Material

Add the following sub-clause to section BE1 sub-clause 4.1.

“The Contractor shall deal with materials from all excavations for structures in such a way as to ensure that usable material is not contaminated with unsuitable material. If usable material is contaminated, such contaminated material shall be removed and replaced with material of standard at least equal to the in situ usable material, all 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.”

BE1 - 4.2 METHODS AND PROCEDURES

BE1 - 4.2.2 Excavations

BE1 - 4.2.2.4 Detection, Location and Exposure of Existing Services

Add the following sub-clause to BE1 4.2.2.

“The provisions of Sub-clause 5.2 of SANS 1200 AA shall apply, in addition to the requirements of this sub-clause.

Where available, the drawings showing the position of known existing services shall be issued to the contractor by the Engineer. The Contractor shall verify the position of all services and all other obstacles and existing works on the Site. Manholes, valve boxes and the like will be regarded as known services. Prior to the commencement of any construction in any particular area, the Contractor shall verify the positions of services and report to the Engineer any that are missing.

Where any subterranean services are shown on drawings, the Contractor shall have the suitable detection equipment available on Site for as long as it necessary to detect and locate such services. The Engineer may instruct the Contractor to undertake hand excavation to expose services.

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

BE1 - 4.2.2.5 Protection of cables

Add the following sub-clause to BE1 4.2.2.

“The Contract shall advise the Engineer at least 7 days in advance of the actual date on which he proposes to excavate near any cable. The Contractor shall not use mechanical equipment to excavate within 3 m of the estimated position of any cable and shall, if necessary, expose the cable by means of hand excavation carried out under proper supervision (complying with all necessary Occupational Health and Safety requirements and standards). When the Contractor is instructed to use hand excavation, the Contractor shall backfill such cable trenches with approved material to the compaction density ordered.

Where a service is damaged due to the Contractor's negligence, the contractor shall bear the cost of the repairs of the service. Any penalty incurred by the Client from the owner/custodian of the damaged service shall be transferred to the Contractor.”

BE1 - 4.2.3 Disposal

Substitute the first sentence of sub-clause BE1-4.2.3 with the following:

“All surplus material which is suitable for fill shall be spread and compacted as fill within a designated area of the site. All material unsuitable for fill shall be transported to an approved dumping site decided upon by the Contractor; the Engineer will not be liable for and disposed materials by Contractor.

Disposal of rubble/surplus material or any other debris/material to be removed from site should be undertaken when said material reaches 6 m³ or has been kept on site for a week, whichever is reached first. The Employer/Engineer may impose fines on the Contractor for the late removal of material from site.”

BE1 - 4.2.7 Dust

Add the following sub-clause:

“Wherever dust from any of Works or construction activities becomes a nuisance to the public or damages adjacent properties, the Contractor shall, at the instruction of the Engineer, apply sufficient water or take other measures to lay the dust. The cost of dealing with dust (including, but not limited to, suppression) shall be deemed to be included in the tendered rates for construction.”

BE1 - 4.2.8 Excavated material not to endanger or interfere

Add the following sub-clause BE1-4.2.8 to SANS 2001-BE1:

“All excavated material shall be so deposited as not to interfere with or endanger the Works (for example, by causing the sides of an excavation to collapse), other property or traffic. The Engineer may order the Contractor to remove any material that the Engineer considers liable to endanger or to interfere with the Works, private property, traffic or pedestrians, and to place such material at some other approved location. If the necessity for such removal is, in the opinion of the Engineer, a result of some fault on the part of the Contractor, the cost of removal shall be borne by the Contractor, but otherwise it will be borne by the Employer.

All surplus material not required for backfilling or forming embankments as indicated elsewhere in the Contract or as may be ordered by the Engineer, and material unsuitable for backfilling, forming embankments or topsoiling shall be deposited on a site or sites as described under BE1 4.2.3.”

BE1 - 5 COMPLIANCE WITH THE REQUIREMENTS**BE1 - 5.2 TOLERANCES****BE1 - 5.2.1 Position, dimension and levels**

Replace the first sentence of sub-clause 5.2.1 with the following:

“The earthworks shall be finished to within the limits given in table 1 to a degree of accuracy II for both ‘Excavations for structural foundations’ and ‘Terraces and embankments’”.

BE1 - 6 SAFETY

Add the following clause and sub-clauses to SANS2001-BE1: 2008

“BE1 – 6.1 Barricading and lighting

In terms of the applicable regulation of the Machinery and Occupational Safety Act, 1983 (Act 6 of 1983), every excavation that is accessible to the public or that is adjacent to a public road or thoroughfare or by which the safety of persons may be endangered, shall be

- a) Adequately protected by a barrier or fence of height at least 1 000mm and as close to the excavation as practicable; and
- b) Provided with red warning lights at night

In addition to the requirements of Act 6 of 1983, the Contractor is required to comply with the requirements set out in the “Contractor’s Agreement (which forms part of this Contract) – Agreement for Qualification of and Code of Conduct for Contractors, sub-Contractors and Owner Builders within the Development known as The Falls” (entered into between the Client, the Contractor and Century Property Developments) sub-clause 3.1.9 “screening of building sites”.

The Contractor may not provide a watchman for the safeguarding of excavations after hours – and as such all excavations are to be left safely barricaded from the public and from tampering.

BE1 – 6.2 Safeguarding of excavations

The provisions of SANS 1200 D-1988 sub-clause 5.1.1.2 are applicable.

Insert the following after paragraph (b)(2), before paragraph (c) of sub-clause 5.1.1.2:

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

The Engineer may request that trenches must be barricaded due to reasons that he sees fit. The barricade will be at least 1,2 metres high and the distance between wire strands will not exceed 200 mm if a wire fence is erected. If a barricade net is erected the openings in the net will not exceed 100 x 100 mm. The barricade (net or wire fence) will be supported at distances not greater than 1 metres with suitable sturdy supports. After completion of the work(s) the barricades must be removed completely and no barricading material may be left on site. The barricade will be erected on both sides of the trench with a minimum distance of 5 metres and a maximum distance of 10 metres from the side of the trench.”

Add the following to SANS 2001 BE1:

“BE1 - 7 SCHEDULED ITEMS

The entire provisions of SANS 1200 D:1990 part 8 (Measurement and Payment) shall apply and where reference is made to clauses/sub-clauses in SANS 1200 D:1990 (Or any other part of SANS 1200) the equivalent clauses in SANS 2001-BE1 shall be applicable instead – where reference is

made to other parts of SANS 1200 then the relevant SANS 2001 standard (where applicable) shall be applicable instead.”

BS1 SITE CLEARANCE – (SUPPLEMENT TO SANS 2001-BS1: 2008)

The following specification is drawn up with SANS 2001-BS1:2008 as a basis, supplemented by the specific sections of SANS 1200-C.

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.

Where suitable topsoil exists within the limits of the area to be excavated, the Contractor shall remove the topsoil to an average depth of 150 mm together with any veld grasses and other similar vegetation as directed by the Engineer. The topsoil shall be transported and deposited in temporary stockpiles in an area which is to be confirmed with the Engineer prior to stockpiling.

Add the following sub-clauses to SANS 2001-BS1: 2008

“BS1 - 6 MEASUREMENT AND PAYMENT

The items scheduled for clearance and demolition will be classified according to the nature of the materials involved and the methods of their disposal.

Only those areas designated to be cleared as per the guidelines of SANS 2001-BS1: 2008 will be measured for payment. The area of surfaced roads, paved areas, railway formations, and major structures falling within such areas, designated to be cleared, will normally be deducted from such measurement.

Where conservation of topsoil without prior clearing is ordered, the removal of topsoil from the specified area will be measured as excavation and no payment will be made for clearing and grubbing.

BS1 - 7 SCHEDULED ITEMS

The entire provisions of SANS 1200 C (latest amendment) part 8 (Measurement and Payment) shall apply and where reference is made to clauses/sub-clauses in SANS 1200 C (Or any other part of SANS 1200) the equivalent clauses in SANS 2001-BE1 shall be applicable instead – where reference is made to other parts of SANS 1200 then the relevant SANS 2001 standard (where applicable) shall be applicable instead.”

CC1 CONCRETE WORKS (STRUCTURAL) - (SUPPLEMENT TO SANS 2001-CC1: 2012)

The following specification is drawn up with SANS 2001-CC1: 2012 as a basis, supplemented by the specific sections of SANS 1200-G.

CC1- 4 REQUIREMENTS

CC1- 4.2 MATERIALS

CC1- 4.2.1 Cementitious binders

Add the following sentence to the end of 4.2.1.2:

“Where the manufacturer of a cementitious binder specifies more stringent storage conditions to those prescribed by this sub-clause then the manufacturer’s requirements shall take precedence.

Where the cement is supplied in bags, the bags shall be closely and neatly stacked to a height not exceeding 12 bags with different brands and/or types of the same brand stored separately.”.

Substitute 4.2.1.3 with the following:

“4.2.1.3 Cement shall not be kept in storage on site for longer than eight weeks or the storage time prescribed by the manufacturer whichever is less”.

CC1- 4.2.3 Aggregates

Add the following sentence to the end of 4.2.3.7:

“In addition to the above, sand is to be stored in such a way that contamination by foreign matter is prevented.”

CC1- 4.3 FORMWORK

CC1- 4.3.2 Design and Construction of Formwork and Falsework

CC1- 4.3.2.1 General

Add the following sub-clause to the end of 4.3.2.1:

“4.3.2.1.7 The design and construction of formwork and Falsework will be the responsibility of the Contractor, however, the Engineer shall review the design and construction thereof for approval. The design and construction of Formwork and Falsework shall comply with all Occupational Health and Safety Act and accompanying regulatory requirements – in addition to the requirements contained in CC1:2012”.

CC1- 4.7 QUALITY OF CONCRETE

CC1- 4.7.8 Mixing

Add the following before section 4.7.8.1:

“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.”

CC1- 4.8 PRECAST CONCRETE

Add the following before section 4.8.1:

“The client employer is indemnified against all claims resulting/which may result from or for infringement of patent rights, design or trademarks in respect of any precast system used in connection with the works and the payment of any royalties due, or that might become due, as a result of the use of such a system.”

CC1- 4.10 HANDLING AND ERECTION OF PRECAST CONCRETE UNITS

Replace the first sentence of sub-clause 4.10.3.1 with the following:

“4.10.3.1. Temporary supports shall be so designed and arranged, by the Contractor and reviewed by the Engineer for Approval, that account is taken of: ”

Add the following sub-clause to SANS 2001-CC1:2012:

“CC1 - 6 MEASUREMENT AND PAYMENT

The entire provisions of SANS 1200 G:1982 part 8 (Measurement and Payment) shall apply and where reference is made to clauses/sub-clauses in SANS 1200 G:1982 the equivalent clauses in SANS 2001-CC1:2012 shall be applicable instead – where reference is made to other parts of SANS 1200 then the relevant SANS 2001 standard (where applicable) shall be applicable instead.”

CS1 STRUCTURAL STEELWORK - (SUPPLEMENT TO SANS 2001-CS1: 2017)

The following specification is drawn up with SANS 2001-CS1:2017 as a basis, supplemented by the specific sections of SANS 1200-H.

CS1- 4 REQUIREMENTS

CS1- 4.2 DRAWINGS

CS1- 4.2.5 Erection drawings

Add the following sentence to the end of sub-clause 4.2.5.1:

“All temporary steelwork necessary for erection purposes shall be designed by a relevant competent person, registered as such with the Engineering Council of South Africa as a Professional Engineer or Engineering Technologist, in the employ of the Contractor.”

CS1 - 6 MEASUREMENT AND PAYMENT

The entire provisions of SANS 1200 H:1990 part 8 (Measurement and Payment) shall apply and where reference is made to clauses/sub-clauses in SANS 1200 H:1990 the equivalent clauses in SANS 2001-CS1:2017 shall be applicable instead – where reference is made to other parts of SANS 1200 then the relevant SANS 2001 standard (where applicable) shall be applicable instead.

1.1.6. Functional Specification

The entirety of the Structural Design aspects of the proposed Works (excluding temporary structures, required for and during construction, as well as any precast units which have to be erected) to be completed are to be designed by the Employer, through their representatives.

The following functional specifications are provided to the Contractor to set a basis for the minimum requirements of elements whose requirements need to be clarified for design and/or pricing and/or construction and/or fabrication purposes. It should be noted that where clarity is given elsewhere in the document on critical elements then such clarity will not be repeated below.

1.1.7. Preliminary and General

- 1.1.7.1. Design of the temporary works shall comply with all requirements of the Occupational Health and Safety Act (latest amendment relevant at the time of appointment), and the Construction regulations (latest amendment relevant at the time of appointment).
- 1.1.7.2. Equipment and plant selected for use by the Contractor shall be specified in the tender document, and shall be selected on the basis of minimizing on site vibration to existing machinery, approval for the equipment and plant shall be at the discretion of the Engineer during construction.

1.1.8. Site Clearance:

- 1.1.8.1. Any materials obtained from the removal of vegetation and demolition of structures, that do not form part of the material to be disposed, shall remain the property of the client or the custodian of the service (should it be a municipal service item).

1.1.9. Earthworks:

- 1.1.9.1 All haul distances for the duration of construction shall be taken as Freehaul and the Contractor shall include all costs associated with this specification into their earthworks rates.
- 1.1.9.2 All existing structures adjacent to where excavations are to be made, which may be affected by Construction operations (SANS 2001 and SANS 10400 shall apply), shall be adequately supported against collapse by the Contractor. Any repairs or replacements for the damage to or collapse of existing boundary walls (and the damage or collapse of other structures resulting from the damage or collapse of the boundary walls) shall be to borne by the Contractor.

1.1.10. Concrete, Formwork and Reinforcement:

- 1.1.10.1. All concrete to be finished to the specifications contained in this specification document, contract documents or drawings.
- 1.1.10.2. All concrete mixes by the Contractor should comply with the minimum requirements set out in SANS 2001-CC1:2012.
- 1.1.10.3. All concrete (preparation, deliver and or erection) is required to comply with the requirements of SANS 2001-CC1:2012

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- 1.1.10.4. All structural concrete to be 35MPa cube strength at 28 days, unless specified otherwise on the construction drawings.
 - 1.1.10.5. All non-structural concrete to be 15MPa cube strength at 28 days, unless specified otherwise on the construction drawings.
 - 1.1.10.6. All exposed concrete elements to have 20mm x 20mm chamfer, unless otherwise stated on the construction drawings.
 - 1.1.10.7. No concrete shall be mixed or ready-mix delivered until the foundations, ground water handling arrangements, reinforcement, joint treatment, clean up, formwork and concrete mixing procedure, handling and placing equipment have been approved by the Engineer.
 - 1.1.10.8. Concrete shall surround the reinforcing bars completely. The reinforcing bars shall not be displaced when depositing or ramming concrete. While concrete is setting it shall not be disturbed or shaken and shall be kept saturated for 7 (seven) days after placing.
 - 1.1.10.9. Concrete shall not be poured at heights exceeding 3m.

1.1.11. Structural Steel Works:

- 1.1.11.1. All structural steel shall be grade S355JR, unless shown otherwise on the drawings.
- 1.1.11.2. All structural steelwork to be hot dipped galvanizing, and the process is to be carried out in strict accordance with SANS 121:2000 / ISO 1461:1999 by an SABS accredited galvaniser
- 1.1.11.3. The Contractor is required to provide workshop drawings to the Engineer for approval prior to commissioning the manufacture of any structural steel elements.

1.1.12. General Requirements:

- 1.1.12.1. The Contractor may be required to support existing cables and other services on site during construction – to accommodate such services during excavation activities. The costs associated with such work (as well as the design and erection of necessary temporary works) shall be deemed to be included in the rates for excavation works.
- 1.1.12.2. The Contractor is required to comply with the requirements of the Occupational Health and Safety Act (latest amendment) and its accompanying Construction Regulations (latest amendment) – and is also required to prepare and submit all documents pertaining with the requirement of the said Act and regulations.

The Contractor's attention is drawn to the following risks which may arise on site:

- 1.1.12.3. Vertical excavations and excavation surface support may be required for the valve chambers structure;
- 1.1.12.4. Working at heights and deep excavations;
- 1.1.12.5. The Contractor is required to accompany their priced documents with a proposed, high level, construction method statement, in line with Occupational Health and Safety, as well as,

Construction Regulation standards. The method statement should include a programme highlighting the activities anticipated for the proposed works.

- 1.1.12.6. The Contractor is required to issue to the Engineer, prior to the use of intended construction materials, test certificates issued by an accredited, independent testing authority (Accredited by the South African Bureau of Standards or other equivalent accreditation body) to confirm that the respective materials comply with the specified requirement, or a certificate by the patent holder or designer, certifying that the manufactured item complies in all respects with relevant product specifications.
- 1.1.12.7. A Degree of Accuracy II (SANS 1200 and 2001) shall be applicable to all structural works under this project.
- 1.1.12.8. The Contractor's Attention is drawn to the fact that this is a multi-disciplinary project and as such Construction work will require adequate integration.
- 1.1.12.9. The review time of 21 days (for reviews to be undertaken) shall apply to all individual submissions. Therefore, where a contractor is aware of items requiring multidiscipline integration then the Contractor should aim to submit all documents at once – otherwise separate submissions shall be treated as individual submissions.

The review time of 21 days shall not be deemed to include comments on the submissions made. Receipt of comments shall trigger a new review cycle.

The above applies to all design submissions issued to the engineer

1.2. DRAWINGS, DOCUMENTATION

- a) The sizes of the drawings shall comply with the "A" series of drawing paper as specified in SANS 822-2007 (3.6.1 A series). Sizes to be used are A3 to A1 only. Letter height sizes and line thicknesses on these drawings shall be not less than 3 mm and 0.3 mm respectively.
- b) Should any manufacturer or the contractor consider any of their drawings or information to be confidential, the documents shall be marked "CONFIDENTIAL" and they shall be treated as such by the client.
- c) All communications, pamphlets and technical literature shall be in English and any programme of work or work breakdown structure shall be in a Gantt Chart format using a suitable software application such as MS Projects.
- d) Where required to do so as per the project scope, The Contractor shall supply complete design calculations in hard copies.
- e) Structural steel fabrication and erection drawings are to be prepared and presented as per the requirements of SANS 2001-CS1: 2017 (or latest amendment)

1.3. INSPECTION AND VERIFICATION

- 1.3.1. For elements of the Works to be delivered complete on site, The Engineer's Representative shall inspect the whole of these works at the manufacturer's, Sub-Contractor's and/or other outside suppliers' works during manufacture. Full information regarding the progress and the necessary facilities to enable the various components to be properly tested and/or inspected shall be given to the Engineer's Representative. The Contractor shall make available his expertise, tools and equipment to the Engineer or his Representative for examination of the work. The Engineer reserves the right to reject any item which has not been presented for such test and/or inspection**
- 1.3.2. Within 10 (ten) calendar days after the date of the signing of the Contract, the Contractor shall submit a comprehensive proposal for a quality assurance plan. The programme shall have facility for the Engineer to indicate hold and witness points as required. The Engineer shall then issue his requirements for quality assurance which shall be based on the Contractor's proposals provided these are adequate and shall be finally subject to the approval of the Engineer. The Contractor shall produce a quality assurance report on any component within 2 (two) days of being so requested. The method of obtaining the samples shall be decided during manufacture. The Engineer shall, if necessary make further checks on the quality of the work and require the removal of the components for tests and measurements at a place to be selected by the Contractor.**
- 1.3.3. Certificates of all tests on materials and components shall be forwarded to the Engineer immediately on completion of the tests.**
- 1.3.4. Inspection during Installation**
- 1.3.5. The Engineer during the course of installation will inspect the work and every reasonable facility is to be afforded by the Contractor for such inspection.**

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- 1.3.6. The Engineer will notify the Contractor in writing of any imperfect or unsound work or of any inferior material which has been supplied and the Contractor shall within 3 (three) working days, proceed to alter, reconstruct or remove such work or supply new material to the standard required by the specification.**