THEMBISILE HANI LOCAL MUNICIPALITY

CONSTRUCTION OFVERENA C BUS AND TAXI ROUTE WARD 11

SCOPE OF WORK

Thembisile Hani Local Municipality hereby invites quotations from suitably qualified service provider for the appointment of contractors for Construction of Verena C Bus and Taxi Route Ward 11 Thembisile Hani Local Municipality.

The scope of work will entail: Construction of Verena C Bus and Taxi Route Ward11 Thembisile Hani Local Municipality as follows:

Scope of the Bus Route and Taxi Route

- Clearing and grubbing
- Cut to spoil of existing materials.
- Construction of a new granular sub-base layer
- Construction of a granular new stabilize base.
- 80mm S-A block paving on the bus route
- The barricading of the works includes all traffic signs and required protective measures.
- Trench excavations for drains, stormwater pipes and associated structures.
- Laying and bedding of concrete pipes
- Backfilling of trenches and restoration of ground surfaces on completion
- Construction of inlet, outlet, junction and manhole structures with concrete, precast concrete and / or brick walls.
- The laying of precast kerbing, edge restraint
- Construction of road signs and markings

Scope of the Intersection widening (R25 and R544)

- Clearing and grubbing
- Cut to spoil of existing materials.
- Construction of G6 selected layer.
- Construction of a new stabilized subbase layer.
- Construction of a new G2 base.
- 45mm asphalt surfacing on the full length of the road.
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- The barricading of the works includes all traffic signs and required protective measures.
- The laying of precast kerbing, edge restraint
- Construction of road signs and markings
- Construction of bus bys

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1. BACKGROUND

Construction of Verena C Bus and Taxi Route Ward 11.CURRENT STATE

1.1. The Municipality currently orders the services on an ad hoc basis as-and-when required.

2. CURRENT STATE

2.1. The Municipality currently orders the services on an ad hoc basis as-and-when required.

3. TERMS OF REFERENCE

3.1. Payment for work completed

3.1.1. Payments will be made within 30 calendar days after submission of Tax invoice.

3.1.2. Claims for payment shall be submitted on a monthly basis and shall consist of the following:

i. Description of work undertaken.
ii. Number of hours worked supported by signed time sheets.
iii. Suppliers invoice for materials used. Distance travelled in km for every category vehicle over and above that for any workincluded for in this contract.
iv. Acceptance certificate signed by the representative of the council.

3.1.3. Tenderers must clearly state the rates to be charged in the spaces provided and must complete the price schedule.

3.1.4. The council reserves the right to add to or omit any plant to or from this contract.

3.2. Response time and work progress

3.2.1. The contractor shall at all times in the execution of his contract ensures that maintenance and repairs of equipment is done in such a manner as to disrupt servicesto a minimum, and to adhere to the council's requirements and site instructions within the stipulated time spans allocated.

3.3. Standard of Maintenance and Repair Work

3.3.1. All maintenance and repair work will be executed in a workman like manner to the satisfaction of the project manager.

3.3.2. The project manager reserves the right to execute such repairs and replacements with his own staff or by any other means.

3.3.3. The contractor will supervise his own workmen, provide his own tools, and where materials are used, this shall comply with the current SABS / SANS specifications, except where otherwise requested by the project manager. The completed repair work and maintenance shall comply with:

a) Occupation Health and Safety Act of 1993 as amended and the regulations pertaining to the said act and any SABS / SANS specifications for materials and installations, which may be applicable.

b) The SABS code of practice for wiring of premises SANS 10142-1, as amended
c) Thembisile Hani Local Municipality, Regulations, By-laws, Rules and other legal instructions.
d) Standard Specification of the Council.

3.3.4. In the event of failure of the contractor to maintain and/or repair any installation to the satisfaction of the project manager, the latter reserves the right to make any arrangements necessary, or expedient in regard to the said maintenance and/or repairsto any installation appearing in the schedule attached hereto and the contractor shall beliable to the council for payment of any damage which the council may suffer as a resultof the contractor's default or neglect.

3.4. Labour Rates

3.4.1. Labour rates asked for in the price schedule shall make provision for supervisors, operations and helpers and shall include all insurance, supervision, holiday allowances, incentive bonuses, profit, insurance and guarantee cost, overheads, etc.

3.5. Commencement of Work and Official Order

3.5.1. No work shall be commenced without the approval of project manager or the representative of the project manager. Accounts submitted for extra work performed will not be entertained unless accompanied by a copy of such written instruction.

3.6. Quality of Supervision

3.6.1. All supervision shall be carried out and facility be kept in such condition that the requirements of the occupational health and safety act no. 85 of 1993 and regulations as amended, is satisfied in all respects. A high quality of cleanliness is required.

3.6.2. Any damages which may occur as a result of poor supervision shall be to the account of the contractor. The contractor will also be held responsible for the safety of all persons working on site.

3.6.3. The contractor will be responsible and answerable for any legal proceeding resulting from non-compliance by him or his staff to act within the boundaries of the facility or such activities associated with the operation of the facility.

3.7. Accommodation and Storage

3.7.1. The contractor shall make all arrangements for accommodation of his workmen and for all the safe storage of his tools, material and vehicles on site.

3.7.2. All plant and materials stored on site must be suitably protected against deterioration through any cause whatsoever, including damage or loss by theft or otherwise. The contractor shall remain fully responsible for all such plant and materials.

3.8. Transport and subsistence rates

3.8.1. Transport rates shall include travelling time and no separated claims for travelling time will be entertained.

3.8.2. Subsistence shall not be priced or paid separately and shall be included for in the labour rates as per this specification.

3.9. Labour Rates and Qualifications

3.9.1. Tenderers shall tender for an hourly labour rate for Key Personnel man-hours required to perform the work and the charge per man-hour shall be taken to cover all ancillary unskilled labour, use of workshop facilities, tools and all overhead and indirect expenses, subsistence and profit.

3.9.2. The council shall have the right to ask for the submittance of the qualifications of Key Personnel employed by the contractor in order to establish if the Key Personnel is duly qualified.

3.9.3. The contractor shall not make use of any learner artisan or learner technician labour unless under the supervision of a duly qualified Key Personnel.

3.10. Training

3.10.1. Tender/s shall indicate in the schedule of information whether they are prepared to assist the council during the contract period within:
a) on-site training of pupil artisans, and
b) upon mutual agreement, specific training at the contractors workshop.

3.10.2. Should such training be called for the details shall be negotiated with the contractor to obtain mutually acceptable training schedules, supervision, reporting, discipline etc.

3.11. Lubricants and Cleaning Materials

3.11.1. All cleaning materials and lubricants will form part of this contract and will be supplied by the contractor at his expense.

3.12. Tools and Workmanship

3.12.1. The contractor must provide all the tools required for the proper execution of the work at his own expenses. He will be responsible for all tools and equipment which is required by the inspector of machinery when inspections are carried out.

3.13. Reporting

3.13.1. It is required of the contractor to report to the representative of the project manager on site before commencing with any work to ensure proper liaison and supervision of all work carried out.

3.13.2. The contractor will also be responsible for conducting routine inspections and perform scheduled maintenance on equipment in accordance with the manufactures operations and maintenance manuals and compile monthly maintenance reports of all pump stations within all regions for reporting to the project manager on an Ad-hoc basis. Such Ad-hoc reports must be submitted on or before the seventh (7th) of every month for the duration of the contract.

3.14. Faulty Workmanship

3.14.1. All labour and transport costs, including those in connection with the breakdowns due to negligent and/or inadequate servicing on the part of the contractor, or faulty and defective equipment and materials etc. supplied by the contractor shall be for the expense of the contractor.

3.15. Functioning

3.15.1. The contractor shall not charge or alter the functioning or design of any piece of equipment or part thereof, without the prior written consent of the project manager.

3.16. Trained staff

3.16.1. Servicing and repair work shall at all times be done by fully trained staff, and under no circumstance may untrained workers be left on site to do any minor work without proper supervision of trained staff.

3.16.2. The contractor shall use competent trained staff directly employed and supervised by him and shall take all responsible care to repair and maintain the installations. The council reserves the right to inspect the tender's premises for plant, equipment and general good management before tenders are awarded.

NOTE:
All Key Personnel certificate of qualification and apprenticeship contracts shall be submitted with the tender for evaluation by this council. A statement of experience gained and on what type of equipment shall be submitted with the tender for each Key Personnel employed. By not complying with this clause, the tender may not be taken in consideration and may lead to disqualification.

3.17. Site visit

3.17.1. It is essential that tenderers visit the sites, so as to acquaint themselves with the prevailing conditions and to check on the units to be serviced.

3.17.2. Inspection of the plants for the purpose of tendering is to be arranged with the Project Manager: Department of Water and Sanitation, THLM.

3.17.3. No claims stemming from the non-compliance with this requirement will be entertained.

3.18. Operation.

3.18.1. All pumping stations, treatment facilities, are generally in operation 24 hours per day, 7 days a week. Boreholes on the other hand are in operation for specific hours, usually 8 hours per day, and are set according to their sustainable yield and recovery time.

3.19. Safety

3.19.1. It will be the responsibility of the contractor to keep the installations safe and in good working order, and all plant rooms must be kept clean and tidy at all times. All work on plant shall conform to the requirements of the Occupational Health and Safety Act, 1993, as amended.

3.19.2. The safety rules and regulations shall be adhered to as stipulated in the OHS Act 1993. The appointed Contractor(s) take full ownership and responsibility for all your employee s' safety on site and clear the Employer from these responsibilities, this include subcontractors.

3.19.3. A safety file shall be submitted to THLM within **fourteen** days of acceptance of appointment, this file shall be kept to date for the duration of the contract and shall be available on request.

3.20. Corrosion

3.20.1. The contractor will be responsible to prevent corrosion on all components of the serviced equipment. Equipment colours or combinations of colours applied to the equipment shall be to the standard laid down by the project manager which are available on request and will generally be the same as the original coat of paint.

3.21. Log Book

3.21.1. It will be the contractor's responsibility to enter into the log book (which will be supplied by the department) all work carried out on any equipment or part thereof whether it be regular servicing, repairs, breakdowns or even routine inspection of the plant.

3.22. Guarantee and Insurances

3.22.1. The contractor shall guarantee all repair work done for a period of six months against poor workmanship.

3.22.2. A contractor's liability insurance, insurance of works and Third-party insurance shall be submitted to THLM within **fourteen** days of acceptance of appointment, this insurance documents shall be kept to date for the duration of the contract and shall be available on request.

3.23. After Hours Call Outs

3.23.1. The contractor shall be required to be available after hours every day for the duration of the contract to attend immediately to any emergency call outs for equipment breakdowns or major pipe breakages at purification works, water and sewer pump stations and on the bulk distribution pipelines.

3.24. Qualified staff

3.24.1. The contractor shall have qualified staff on site at all times when servicing and repair work is carried out on any equipment.

3.25. Materials and Spare Parts

3.25.1. The council reserves the right to either purchase materials and spare parts for use by and to supply it to the contractor or alternatively to accept the materials and spare parts at prices submitted by the contractor as per this agreement, whichever proves to be the most economical for the council.

3.26. Consumables

3.26.1. All consumables required for the maintenance and servicing of the works shall be supplied by the contractor. This includes all tools, testing equipment, transport, labour and scaffold as required. Under no circumstances are the department's tools, equipment or materials to be utilized.

3.26.2. Tenderers are to base their tenders on the information listed in the schedules of equipment and additional information established during his site visit. It is the responsibility of the tenderer to ensure that the quantities and technical information on which his tender is based are correct.

3.27. Security

3.27.1. The Service Provide is responsible to ensure safety of material provided for use under this contract prior to installation. Council will not be responsible for any losses.

4. SERVICE LEVEL AGREEMENT

4.1. A service level agreement will be entered into with the successful bidder before any work/task may be executed.

5. NON-COMPLIANCE AND PENALTIES

5.1. Failure to comply with any of the aforementioned clauses may invalidate the tender or cause cancellation of the contract.

5.1.1. THLM Reserve the Right to the following;

5.1.1. To implement penalties for poor quality of work,

5.1.2. To implement penalties for late delivery of work,
5.1.3. To terminate the contract if the response time by the contractor is more than that described on the incident management protocol of the Department,
5.1.4. o add additional items to the BoQ or to remove as required,
5.1.5. All rates are fixed & firm and all quantities are re-measurable.

SCOPE OF WORK AND SPECIFICATIONS

1. PROJECT OBJECTIVE

The purpose of the project is to appoint a service provider or service providers for the construction of the **CONSTRUCTION OF VERENA C BUS AND TAXI ROUTE WARD 11** within the Thembisile Hani' s area of jurisdiction.

This work is both plant and labour intensive. The successful bidder must optimally utilise labour intensive methods to maximise employment opportunities to the local community in line with the THLM requirements.

2. AREAS

The project is situated within Nkangala District Municipality in Mpumalanga province, and it falls under Thembisile Hani Local Municipality. Verana C is situated 42 km south of Kwamhlanga, they gain access via R573 and R544 road. The GPS coordinates and municipal wards of the townships are presented in a table below.

Table -1: Location of Area

No	Township/Village name	Ward	Latitude (S)	Longitude (E)
1	Verena C	11	-25.486716°	29.016085°

3. SCOPE OF WORK

The service provider will be expected to demonstrate understanding of the work through a systematic assessment methodology, detailed task breakdown and sound safety management practices. The minimum scope of work is guided by, but not limited to, the following:

This list is not necessarily complete nor will it limit the extent of work to be carried out under this Contract:

a. Roadworks

Scope of the Bus Route and Taxi Route

- Clearing and grubbing
- Cut to spoil of existing materials.
- Construction of a new granular subbase layer
- Construction of a granular new stabilize base.
- 80mm S-A block paving on the bus route
- The barricading of the works includes all traffic signs and required protective measures.
- Trench excavations for drains, stormwater pipes and associated structures.
- Laying and bedding of concrete pipes
- Backfilling of trenches and restoration of ground surfaces on completion
- Construction of inlet, outlet, junction and manhole structures with concrete, precast concrete and / or brick walls.
- The laying of precast kerbing, edge restraint
- Construction of road signs and markings

Scope of the Intersection widening (R25 and R544)

- Clearing and grubbing
- Cut to spoil of existing materials.
- Construction of G6 selected layer.
- Construction of a new stabilized subbase layer.
- Construction of a new G2 base.
- 45mm asphalt surfacing on the full length of road.
- The barricading of the works includes all traffic signs and required protective measures.
- The laying of precast kerbing, edge restraint
- Construction of road signs and markings
- Construction of bus bys

b. GENERAL

- Servitude / wayleave management

C3.2 ENGINEERING

C3.2.1 DESIGN

a) The Employer is responsible for the design of the Permanent Works as reflected in the Contract Documents unless otherwise stated.

b) The Contractor is responsible for the design of the Temporary Works and theircompatibility with the permanent Works.

c) The Contractor shall supply all details necessary to assist the Engineer in thecompilation of the as-built drawings.

C3.2.2 EMPLOYER'S DESIGN

The Employer is responsible for the design of the entire scope of works, including all peripheral repair and site works.

C3.2.3 CONTRACTOR'S DESIGN

Where Contractor is to supply the design of designated parts of the permanent Works or temporary Works, he shall supply full working drawings supported by a professional engineer's design certificate.

C3.2.4 DRAWINGS

The Contractor shall use only the dimensions stated in figures on the Drawings in setting out the Works, and dimensions shall not be scaled from the Drawings, unless required by the Engineer. The Engineer will, on the request of the Contractor in accordance with the provisions of the Conditions of Contract, provide such dimensions as may have been omitted from the Drawings.

The Contractor shall ensure that accurate as-built records are kept of all infrastructure installed or relocated during the contract. The position of pipe bends, junction boxes, duct ends and all other underground infrastructure shall be given by either co-ordinates or stake value and offset. Where necessary, levels shall also be given. A marked-up set of drawings shall also be kept and updated by the Contractor. This information shall be supplied to the Engineer's Representative on a regular basis.

All information in possession of the Contractor, required by the Engineer and/or the Engineer's Representative to complete the as-built/record drawings, must be submitted to the Engineer's Representative before a Certificate of Completion will be issued.

The Drawings prepared by the Employer for the permanent Works shall be issued as and when required.

Project tendered drawings

	VERENA-C LIST OF DRAWINGS		
	DESCRIPTION	DRAWING NUMBER	REVISION
1.	GENERAL KEY PLAN LAYOUT	S/0523/RD02/KP01	0
2.	GENERAL PLAN LAYOUT - SHT 01 OF 04	S/0523/RD02/DL01	0
3.	GENERAL PLAN LAYOUT - SHT 02 OF 04	S/0523/RD02/DL02	0
4.	GENERAL PLAN LAYOUT - SHT 03 OF 04	S/0523/RD02/DL03	0
5.	GENERAL PLAN LAYOUT - SHT 04 OF 04	S/0523/RD02/DL04	0
6.	LONGITUDINAL SECTIONS - SHEET 01 OF 04	S/0523/RD02/LS01	0
7.	LONGITUDINAL SECTIONS - SHEET 02 OF 04	S/0523/RD02/LS02	0
8.	LONGITUDINAL SECTIONS - SHEET 03 OF 04	S/0523/RD02/LS03	0
9.	LONGITUDINAL SECTIONS - SHEET 04 OF 04	S/0523/RD02/LS04	0
10.	CROSS SECTIONS	S/0523/RD02/CS01	0
11.	CULVERT CROSSING DETAILS - SHT 01 OF 03	S/0523/RD02/TP01	0
12.	CULVERT CROSSING DETAILS - SHT 02 OF 03	S/0523/RD02/TP02	0
13.	CULVERT CROSSING DETAILS - SHT 03 OF 03	S/0523/RD02/TP03	0
14.	CULVERT SIZE AND POSITION LAYOUT	S/0523/RD02/TP04	0
15.	INTERSECTION PLAN LAYOUT AND DETAILS	S/0523/RD02/TP05	0

C3.2.5 DESIGN PROCEDURES

Existing infrastructure will be considered under this contract.

C3.4 CONSTRUCTION

C3.4.1 GENERAL SPECIFICATION

This section of the Contract documents should be read together with all other sections and Standardized and Particular Specifications included in the Contract documents or Standardized Specifications mentioned in the Contract documents, but separately available. The documents should be read and interpreted jointly to determine the full requirements of the Contract.

C3.4.2 SITE ESTABLISHMENT

The Contractor is responsible for Site Establishment. The construction yard will not be serviced, and the Contractor shall make arrangements to connect all necessary services to specific points. The Contractor shall bring to the Site all his necessary construction equipment and install all stationary construction equipment and plant at locations and in the manner accepted by the Engineer. The Contractor shall submit sufficiently detailed plans showing the proposed locations of such stationary equipment and other pertinent data. No installation of such stationary equipment shall be undertaken unless the corresponding plans have been accepted by the Engineer.

Services and facilities provided by the Employer

Source of water supply

The Contractor shall make his own arrangements for the supply of water for construction and testing purposes. The Contractor will be required to supply, install, operate, and maintain at his cost, such temporary pipework and storage facilities as may be necessary to ensure sufficient supply. The supply shall be metered. The Contractor will also be required to pay all connection fees, cost of water drawn from the water supply authority's system at the ruling tariffs in force at the time as well as include all such requirements throughout the duration of the Contract.

Source of power supply

The Contractor shall make his own arrangements temporary power supply for construction purposes. The Contractor will be required to make his own arrangements with and pay all the requisite connection

and consumption charges for whatever temporary power supplies he may require for his use on the site as well as include all such requirements throughout the duration of the Contract.

Facilities provided by the Contractor

Contractor's camp

On this Site, the Contractor shall be responsible in establishing the final grade for his site establishment requirements including; construction offices, storage areas, warehouse, machine and repair shops, fuel tanks, storage tanks, power and water distribution lines and provide such related facilities and sanitary conveniences that are necessary for maintaining health, peace and order, and safety in the work areas. The positions of all buildings constructed by the Contractor for his own use will be subject to the acceptance of the Engineer. Temporary and permanent fencing around the Contractor's Site establishment areas and electrical and mechanical apparatus connected to the electrical supply shall be erected by the Contractor where needed. On completion of work on Site, buildings constructed by the Contractor for his own use shall be demolished, including foundations, and the ground reinstated. Underground services to these buildings shall be removed.

The Contractor shall be responsible for all temporary services required by him both for the site establishment area, camp site and for construction purposes, including water, electricity, sewage, and communication facilities.

Covered accommodation for perishable or corrodible materials, fittings and the like shall be adequate and suitable for their purpose and, particularly in the case of cement stores, shall be well ventilated, weatherproof and waterproof with floors raised off the ground, so as to keep the materials perfectly dry and freely aerated. All such accommodation shall be subject to the approval of the Engineer who shall always have free access to the premises.

In addition to the above, the Contractor shall provide one toilet per 10 workmen. Portable toilet facilities shall be made available to workers of both male and female genders, the number provided to be in proportion to the ration of the sexes. The toilets shall be in the vicinity of the work site, shall be screened from public view and the use thereof shall be enforced. The Contractor shall, where applicable, make the necessary arrangements for the regular removal of night soil. The Contractor is to ensure portable toilet facilities are cleaned on a regular basis.

Storage and laboratory facilities

The Contractor shall provide all storage and laboratory facilities required for the proper execution of the works.

Other services and facilities

The requirements of the Engineer's Site establishment will be issued by the engineer as and when required.

Disposal of refuse

The Contractor shall be responsible for the disposal of refuse and waste generated by his staff daily. The site is to be kept clean, neat, and tidy, to the Employer's satisfaction.

Telephone facilities

The Contractor is to provide his own telephone facilities as well as facilities for the use of the Engineer, or his representative for the duration of the Contract.

Housing facilities

The Contractor will not be required to provide housing facilities for the Engineer's staff. No accommodation for the Contractor's employees will be permitted on site.

Notice boards

The Contractor will be permitted to display two notice boards advertising his Contract on or near the Site or access points to the project area. The notices shall be of a form and in a position accepted bythe Engineer and shall include details of other parties involved (including the Employer) as well as the Contractor. No advertisement shall be displayed without the acceptance of the Engineer.

Site usage

Working with road reserves, Eskom servitudes, etc.

The Contractor is to confine his activities strictly to the indicated working areas and to the spoil sites and the direct access roads to these. He shall not work outside his designated working areas except with the prior approval of the Employer, in writing. It is advised that the Contractor takes note of damaged structures or parts thereof and report these to the Engineer in writing before work starts at or near an existing structure to prevent possible disputes with the occupant or owner.

Site safety and precautions against nuisance

The Works is to be conducted within residential areas with pedestrian and vehicular traffic. Thewatching, barricading, lighting, and traffic control on site shall be carried out where required in strict compliance with these specifications. The Contractor shall ensure that all safety measures are strictly adhered to.

Plant used on the Works shall be as efficiently silenced as possible and noisy operations will be permitted between the hours of 07:00 and 17:00 only. Any work outside normal working hours requires written approval by the Engineer 24 hrs in advance.

Dust suppression is required for all earthworks activities prone to form excessive dust. Any rock or debris falling from trucks on any haul road shall be removed immediately. Precautions shall be taken to prevent fouling of the site and public roads by trucks. The Engineer may instruct the Contractor to clean roads where any material or debris deposited by any construction vehicle may constitute a danger tothe public.

The Contractor is solely responsible for the security of his camp, plant, and materials. The Contractor is to familiarise himself with the locality of the proposed site and allow sufficient security measures to protect the works. The Employer will not be held responsible for any damages, theft or

Permits and wayleaves.

The Contractor shall be responsible for obtaining all of the necessary wayleaves, permissions or permits applicable to working near any existing services or other infrastructure on Site, and shall ensure that any wayleaves, permissions or permits obtained by the Employer's Agent prior to the award of the contract are transferred into the Contractor's name.

The Contractor shall abide by any conditions imposed by such wayleaves, permissions or permits.

Further details on wayleaves are specified in Clause 1202 of the Project Specifications

Alterations, additions, extensions, and modifications to existing works

Interfaces with existing works are indicated on the relevant drawings as far as possible. The Contractor shall take note of these and make appropriate allowances for dealing with, and where necessary, making modifications or tying into these services.

Inspection of adjoining properties

The Contractor will be required to inspect all properties within 50m radius of any excavation on site before and after completion of the works. A detailed written and photographic record of the inspectionsis to be submitted to the Engineer and Client prior to excavation activities commence.

Water for construction purposes

The Contractor is required to construct and maintain standpipes for construction water, in case of water carts and similar plants the contractor is required to follow all the rules and regulations that are in place in order for one to acquire water from local streams and rivers.

Survey control and setting out of works

Before commencing the operations, the Contractor shall locate and mark all survey pegs and beacons and shall immediately submit a written report in duplicate of any missing or damaged pegs and beacons to the Engineer's Representative, who shall verify the facts and return a countersigned copy of the report to the Contractor. Other than in the case of setting out pegs, the Contractor will be held responsible for the replacement by a registered land surveyor of all beacons or pegs found damaged or missing on completion of the Works which were not reported as such by the Contractor before commencing operations.

Survey records of beacons, benchmarks, etc., replaced shall be submitted to the Engineer. Attention in this regard is drawn to Sections 35(1) and (2) of the Land Survey Act of 1927 which lays down the penalties applicable to those who are responsible for interfering with permanent survey beacons, bench marks, reference marks or trigonometric stations.

C3.4.3 PLANT & MATERIALS

Materials supplied by the Employer.

No materials will be supplied by the Employer. The construction yard will not be serviced, and the Contractor shall arrange to connect all necessary services.

Materials, samples, and shop drawings

All materials required for incorporation into the permanent works are to be supplied by the Contractor. Where possible, these materials shall be sourced from within the area, considering availability of supply, price, and continuity of supply. In-situ material can be used where suitable. Spoiling and spreading of material will not be permitted on site and suitable temporary stockpile areas must be identified by the Contractor and approved by the Engineer prior to stockpiling.

C3.4.5 CONSTRUCTION EQUIPMENT

The Contractor shall provide all construction equipment and plant necessary to complete the works.

Requirements for equipment

All construction equipment shall be used for the purpose that it was designed for, should be in good working condition and shall be used in a safe manner and shall comply with all relevant legal and roadworthy aspects.

Equipment provided by the Employer.

The Employer will not provide any plant and equipment required for construction purposes. All equipment and plant required shall be provided by the Contractor.

C3.4.5 EXISTING SERVICES

Known services.

The position of the known existing services will be indicated on the layout drawings as far as reasonably possible. The Contractor shall, however, take note of the fact that this is a developed site which is adjoined and crossed by many services. The Contractor must therefore make provision for suitable means of locating and accommodating all services, including those not known or shown on the drawings. This, however, does not relieve the Contractor from responsibility of verifying if any additional services are present in the area by searching and probing the terrain in question for any existing services or indications of the presence of such services. The Contractor shall at all times exercise the utmost care when working in their vicinity and shall take all necessary steps to protect any existing services whatsoever against damage which may arise as a result of his operations on site. TheContractor shall bear the cost of the repair of damage to any service the possible existence of which could reasonably have been

ascertained by him in good time. All cables and pipes shall be considered "live" unless confirmed otherwise by the relevant service authority.

Treatment of existing services

Work will be carried out in the vicinity of existing services and all such services shall remain in operation at all times, except where arrangements have been made for the interruption of the service for the purposes of carrying out the Works under this Contract.

Existing overhead and underground services may be indicated on drawings held by the respective service providers. Should the Contractor find evidence of possible buried services, he shall notify the Engineer immediately thereof. The Engineer will assess the situation and instruct the Contractor on an appropriate course of action to be taken.

The Contractor shall be responsible for checking the locations of all services and to ensure that no damage is cause by construction operations.

The Contractor, before starting any excavations or where indicated in the scope of work or siteinformation that underground services either cross or are located adjacent to the Works that is to be constructed, such services shall be exposed by hand ahead of trenching operations to enable any changes that might be needed in the design of the pipelines to be made timeously. Care shall be taken in exposing such services to avoid damaging them. An item has been allowed for in the Bill ofQuantities for hand excavation or other methods to search for existing services.

All cables and pipes shall be considered "live" unless confirmed otherwise by the relevant service authority.

Use of detection equipment for the location of underground services

The Contractor shall be allowed to use non-intrusive equipment for the location of existing services if so agreed. Should excavation be required to identify and or expose any services this shall be for the account of the contractor and shall only proceed once the relevant permits or approvals have been issued by the Employer.

Damage to services

Should any existing services be damaged by the Contractor, the Engineer shall be informed immediately. The Contractor shall repair the damaged service if so instructed by the Engineer or shall assist in the repair of the service as instructed by the Engineer at the Contractor's own cost.

C3.4.5 PROCUREMENT

Preferential procurement procedures

The works shall be executed in accordance with the Preferential Procurement Policy Framework Act and Preferential Procurement Regulation 2011.

C3.5 PROJECT MANAGEMENT

C3.5.1 Management of works

C3.5.1.1 Planning and

programming.

The Contractor shall ensure that he:

- is well informed about the *Employer*'s overall implementation programme for construction and investigative projects and makes available resources as required to efficiently complete required services; and
- compiles designs, documentation, reports, and drawings timeously as not to unnecessarilydelay the implementation of the construction or investigative projects.

The programme shall at minimum contain:

- Time Scale (minimum): Days, where the project period does not exceed three months. Weeks, where the project period exceeds three months.
- Time Scale (maximum): Months, where the project period does not exceed one year. Years, where the project period exceeds one year.
- Tasks: All construction tasks and activities shall be shown. Where phases or stages are anticipated, this shall be the highest level of division and all tasks related to the successful accomplishment of that phase of the project shall be grouped. Resources allocation and task dependency shall be indicated.
- Multiple Project Programming: Where multiple projects are part of the same Contract documentation, the Contractor shall provide a programme per project. However, where interdependency exists the programmes shall be integrated, but divided on the highest level per projectfollowed subsequently by further divisions per phase or stage.
- Start and Finish Dates: All tasks shall have specific start and finish dates.
- Critical Path: All tasks forming the programme line that will establish any delays in the overall project period shall be clearly indicated and an indication of their sensitivity characteristics shallbe provided.
- Progress Tracking: The Contractor shall be required to periodically (at minimum monthly) indicate the project progress per task graphically and on a percentage basis.
- Non-working Time: All South African public holidays, weekends, and the local traditional annual builder's break (as identified in the contract data) shall be incorporated in the programme.

The Contractor's Programme shall include:

- Dates for submission (by the Contractor) of designs and or design documents.
- Dates for ordering of special and/or long delivery items.
- Dates for issue of or approval of drawings for planning purposes.
- Dates for issue of or approval of drawings for manufacture and construction purposes requiring the approval of the Engineer.
- Dates for the placement of orders for material, receipt of material, fabrication, and manufacture, works (factory) testing, shipment, erection and commissioning.
- Dates showing start and completion of site construction of each section and each major component of the permanent works.
- Dates showing the delivery of all built-in steelwork, anchor bolts, etc.
- Dates for start and completion of Engineering Design (including allowances for review/approval by the Engineer).
- Dates for submittal and acceptance of drawings.
- Dates for submittal of operation and maintenance manuals.
- Dates for submittal of commissioning check lists and detailed commissioning schedules for acceptance (3 months before the commencement of commissioning).
- Dates for submittal of commissioning check lists and detailed schedules of approval (3 months before the commencement of commissioning).
- Dates for submission of complete schedules for all manufactured items.
- Dates for Test on Completion as defined in the Contract Data.

Activities shall be timed in week units except for commissioning or similar detailed programmers, which shallhave activities, specified in days. Activities on which it is intended to operate multiple shifts working shall beclearly defined.

Method and resources statements are required for all critical items to prove that the period allocated to themfits the overall programme and that the Contractor's plant and labour are consistent with the time allowed. Critical items shall include (as a minimum) all reinforced, structural steelwork, pipework, tie-ins to existing services and specialist work.

The Contractor shall update and revise the Programme once a week or when required by the Engineer.

The submission to and acceptance by the Engineer of such updated and revised Programme, shall not relievethe Contractor of any of his duties or responsibilities under the Contract and existing laws.

Sequence of the Works

Whenever work being done by other Contractors is contiguous or related to the Works included in this Contract, the sequence of handling the Works shall be such that the least delay possible will result to each Contractor and such sequence may be determined by the Engineer. The Engineer will establish the respective rights of the various interests involved to secure the completion of the various portions of the Works in general harmony.

The Contractor shall be responsible for the coordination and proper execution of the Works, including coordination with other Contractors and organizations to the extent specified in the Contract Documents. The Contractor shall, as specified in the Contract Documents, afford all reasonable opportunities for carrying outtheir work to:

- any other Contractors employed by the Employer,
- the staff and workmen of the Employer, and
- the staff and workmen of any legally constituted public authorities who may be employed inthe execution on or near the site of any work not included in the Contract, which the Employer may require.

The Contractor shall obtain, co-ordinate and submit to the Engineer for his information all details (including details of work to be carried out off the Site) from Sub-contractors. The Contractor shall be responsible for the locations of their work or materials, in order to ensure that there is no conflict with the work of other Sub- contractors, the Contractor or other Contractors.

The Contractor shall give the *works* the constant attention necessary to facilitate the progress thereof and shall cooperate with the Engineer and other Contractors in every way possible.

C3.5.1.2. Software application for programming

Only the "Microsoft Project" or CCS software package will be accepted.

The Contractor shall make the programme available in MS Project format or CCS and in print version. The Contractor shall also ensure that all necessary hardware and software in this regard are always available on site and that at least one member of the permanent site staff is competent on their operation.

C3.5.1.3 Methods and procedures

C3.5.1.3.1 Monthly report

The Contractor shall prepare and submit to the Engineer within 15 days after the first day of every month a written progress report together with a monthly progress schedule summarizing the progress of the varioussections of the work both at the place of manufacture and at site. Three (3) copies of the monthly progress report shall be submitted in accordance with the correspondence procedures.

Such progress reports shall indicate accurately the status of different activities covering design, material procurement, manufacture, works (factory) tests, shipping, erection, testing and commissioning and shall berelated to key dates identified in the programmers referred to in the *conditions of contract*. The report shallalso include data on labour strength and equipment employed. The programme submitted with the monthlyreport shall show cumulative progress towards scheduled completion, expressed as a percentage, of all itemsshown in the contract schedule.

The reports shall indicate the degree of criticality on each section of the Work, together with the slippage orimpending slippage on any key event and shall be directly related to the contract schedule and supporting detail program for sections of work.

The monthly progress report shall be in the format acceptable to the Engineer and written in the English language and shall include:

- Photographs and detailed descriptions of progress, including each stage of design (if applicable), procurement, manufacture, delivery to the Site, construction, erection, testing and commissioning.
- Charts showing the status of construction documents, drawings, purchase orders, manufacture, and construction.
- For the manufacture of each main item of plant and materials, the name of manufacturer, manufacture location, percentage progress, and the actual or expected dates of commencement of manufacture, Contractor's inspections, tests and delivery.
- Records of personnel and Contractor's equipment on the Site.
- Copies of quality assurance documents, test results and certificates of materials.
- Safety statistics, including details of any hazardous incidents and activities relating to environmental aspects and public relations; and
- Comparisons of actual and planned progress, with details of any aspects which may jeopardize the completion in accordance with the Contract, and the measures being (or to be) adopted to overcome such aspects.
- Financial status of Contract.

C3.5.1.3.2 Weekly report

The Contractor's Site Manager shall prepare a weekly summary report covering all the site activities and submit it to the Engineer. This report shall include projected work activities for at least 2 weeks ahead of those being reported upon. In addition, this report shall include a weekly site labour return giving imported and local labour and each Sub-Contractor's labour, broken down into trades. Full details of site labour disputes (or off-site disputes affecting the Contract) shall be reported to the Engineer immediately. The weekly statement shall give details of all construction plant machinery, offices, and materials. The Contractor shall submit three (3) copies of weekly report to the Engineer which shall include.

- Summary of progress.
- Potential problems and proposed solutions.
- Project schedule update.
- Project permit status.
- Construction photographs.
- Status of orders and procurement.
- Drawing list.
- Plant test schedule
- Construction schedule (critical path method, S-curve).

The Contractor shall submit to the Engineer a weekly return detailing the numbers of the various classes of workmen employed by him on the Site, the plant and Contractor's equipment on the Site or on order and any other information that may reasonably be required.

C3.5.1.3.3 Detailed programme and progress reports

Detailed monitoring of the progress of the Contract by the Contractor is to be achieved using critical path network planning and review techniques.

Following approval of the Programme, the Contractor shall submit within thirty (30) days, detailed program for all work to be executed during the Contract. These programs, which shall embrace design, supply, manufacture, and site construction shall be based on the Contract Programme and be used as target program and may be subject to revision. Further detailed program for progressive stages of the Contract shall be prepared by the Contractor as required by the Engineer.

The Contractor shall, whenever required by the Engineer, also provide in writing for his information a general description and drawing or sketch of the arrangements and methods which the Contractor proposes to adopt for the execution of the Works.

The Contractor shall plan in detail his section of the work using bar charts to record progress of the design, manufacturing, and delivery elements and using the critical path network procedure for work on site. The issue and approval of drawings shall be covered in detail using appropriate check points in the detailed programme, including design information interface events with others. The manufacturing work shall be broken down into check points in the detailed programme. The manufacturing work shall be broken down into sufficient detail for the information supplied to relate correctly to the erection detailed programme on which the activity durations shall not exceed four weeks. Activities shall cover all aspects for which the Contractor or his Sub-contractors are responsible and indicate site access, points at which terminals and access will be available to or required from others and services required from the Employer.

The Contractor shall ensure that the resources required to meet these programs are available to him and his Sub-contractors. A table shall be prepared indicating the expected level of each type of resource for the duration of the site work.

The detailed programs must be analyzed by the Contractor, either manually or by computer, and three copies of the following tabulations presented:

- A schedule tabulated in order of increasing total float showing for each activity:
  - event numbers,
  - Brief description of activity and responsibility,
  - duration,
  - early and late
  - starting and finishing dates,
  - total float.
- A schedule tabulated in order of early start date by total float for eight weeks ahead of the 'up-date' date. The information given in this schedule shall be the same as that indicated above.

All programs and progress reports shall be provided by the Contractor in a form acceptable to the Engineer. Full access shall be made available to the Engineer to visit the Contractor's and Sub-contractor's works to verify the status of design and manufacture.

Other requirements in respect of programs are given in the Conditions of Contract.

C3.5.1.3.4 Progress meetings

The Contractor will be required to attend regular formal construction progress meetings with the Engineer during manufacture and on site. The site meetings will also involve the other Contractors so that the progress of construction both on this Contract and the entire Project may be reviewed. Such meetings maybe monthly and may require the up-dating of the Contractor*'s* Contract and detailed Programs, in which case three copies of the up-dated programme shall be submitted to the Engineer within 7 days of the agreed up-dating.
The Contractor shall also attend informal weekly meetings with the Engineer on site and provide a weeklyestimate of the work anticipated on each work section.

The updated programme, if necessary, after reconciliation and incorporation of changes, shall become thenew basis for further execution of the *Works* without any modification of the Contract's *completion date*. The updating of the programme shall not give rise either to any extension of time or to any entitlement for any additional payment.

C3.5.1.3.5 Interface meetings

The Contractor shall hold regular interface meetings with all other contractors who may be performing work on behalf of the Employer and with representatives of the Employer involved with the activities related to or in the vicinity of the works to be performed under this Contract.

The purpose of the interface meetings shall be to ensure that the work the Contractor is performing on the project is efficiently and effectively coordinated without duplication or miscommunication and that there is full compatibility between sections that are designed and constructed by the various contractors.

C3.5.1.4 Quality plans and

controlC3.5.1.4.1 General

The Contractor shall have a well-organized Quality Control and Assurance System (QAS) based on ISO 9000
Series or equivalent (Quality System Model for Quality Assurance in design/development, production, installation and servicing) to assure that items and services, including subcontracted items and services, comply with the Works Information.

This clause specifies the minimum requirements necessary to ensure that proper attention is given to the materials used, the standard of workmanship, the manufacturing and construction processes, and the quality of all components.

The Contractor shall include in all his orders to Sub-contractors a note stating that materials and plant covered are subject to inspection by the Engineer.

C3.5.1.4.2 Quality Control and Assurance System

All design, manufacturing, processing, testing and inspection operations affecting the plant or material shall be governed by Quality Assurance procedures in accordance with the directives of the ISO 9001 standards while the production and installation shall be governed by quality assurance procedure in accordance with the directives of the ISO 9002 standards or equivalent. These may be subject tosurveillance by the Engineer. A tentative QAS shall be submitted together with the tender and shall meetthe requirements stated in the Design Procedure. Within thirty (30) days of the Commencement Date, theContractor shall submit six (6) copies of his complete quality control and assurance procedures, manuals for review and acceptance by the Engineer. The manual shall include pro-forma checklists for all requirements of the Contractor*'s* quality control and assurance program and those called for in the WorksInformation.

The Quality Control and Assurance System to be submitted shall include but not necessarily be limited tothe following:

Programme requirements for materials and plant procurement and manufacture with description of design control, purchased material control, quality verification tools, manufacturing control, materials andcomponents selection, handling, and packaging, etc.

- Programme requirements for plant production with detailed description of Quality Assurance organization of the Contractor, Quality Assurance Functions and Procedures and Performance Monitoring.
- Quality Assurance Programme Tests with detailed description of the test procedures to be conducted.
- Quality Assurance Programme requirements for installation and commissioning (for turnkey Contracts with detailed description of Quality Assurance Organization of the Contractor, Quality Assurance Functions and Procedures, etc.).
- In addition to the requirements of these ISO Standards or their equivalents the Contractor shall:
- Establish procedures for adequate planning and resourcing of all quality related activities includingthe preparation of quality plans.
- Establish measures for the identification and control of items throughout all stages of the Contract.This shall include measures to maintain traceability as identified in agreed quality plans.
- Arrange for the protection of quality of the product to include delivery to the specified destination.
- Control their measuring and test equipment in accordance with established procedures for measurements and calibration systems and ensure that such equipment that may be used by Sub-contractors to verify work is similarly controlled.

Where any site installation and/or test and commissioning work is involved, the Contractor shall prepare contract specific quality assurance procedures in agreement with the Engineer prior to commencementsof such works.

The Contractor shall be responsible for specifying the quality assurance requirements to his Sub-

contractors, for approving Sub-contractor's quality assurance programme and for ensuring compliance with the requirements.

The Contractor shall ensure that all appropriate technical information is extracted from the Contract documents and specifications and passed on to the Sub-contractors.

The Contractor shall ensure that all computer systems and software to be utilized on the project isqualified for the application under consideration and such qualification is documented. The following surveillance requirements shall be included for affirmation by the Engineer or his representative:
Record (R). Documentary evidence of the activity and statistical analysis of the data to be retained andcopied to the Engineer.

Verification (V). The Engineer or his representative will not necessarily be present during the activity but documentary evidence to permit verification of compliance with the requirements is generated, retained,and copied to the Engineer.

Witness (W). The Engineer or his representative requires notification to permit witnessing of the activity.The notice period shall be agreed to depending on the nature of the activity and shall be reviewed from time to time. Documentary evidence shall be retained and copied to the Engineer.

Hold (H). The Contractor may not proceed to the following activity until the Engineer or his representativehas approved the proceeding activity. Documentary evidence shall be retained and copied to the Engineer.

Random (R). Construction monitoring by random inspection. Random construction monitoring may be carried out at any stage of the activity or preparation for the activity. Documentary evidence shall be retained and copied to the Engineer.

Categorization

The following categories shall apply in determining the requirement for a Quality Control Plan:

Category	**Clarification**	**Quality Control Plan**
Critical	A component, group of components, structure, the failure of which to comply with the specifications may affect the performance of the works of which it is apart and /or will cause a detrimental environmental impact, and /or may result in hazardous or unsafe conditions.	Required for all components.
Major	A component, group of components, structure, element of a structure or facility, other than categorized as critical, the failure of which to comply with the specifications may compromise the performance of the works of which it is a part, result in increased, maintenance and/or impact negatively on the quality of the works.	As determined by the Contractor and to the approval of the Engineer.
Minor	All items other than those categorized as critical or major and which are visible and	As determined by the Contractor

C3.5.1.4.3 Quality management audit

The Contractor shall carry out periodic assessments of the adherence to the Quality Plan and Quality Control Plans by senior qualified staff who are not normally employed on the Site. The Engineer and/or hisrepresentative shall be invited to attend at the periodic assessments meeting and be afforded the opportunity to report on the implementation of the Quality System at the Site. The assessment reports shall be copied to the Engineer.

C3.5.1.4.4 Corrective action

The Contractor's quality assurance programme shall provide for prompt detection and correction of all events and conditions adversely affecting quality, including failures, malfunctions, incidents, trends, deficiencies, deviations, non-conformances, and defective materials.

The Contractor shall establish and maintain methods for verifying and determining the cause of an adverse condition and for initiating necessary improvement and corrections to preclude repetition. Quality trends shall be analyzed to furnish a basis for improvement in work performance. The Contractor's corrective action system shall extend to the performance of other participating Contractors and Sub-contractors when necessary and shall provide for the interchange of corrective action information. Identification of the adverse condition, its cause, and the corrective action taken shall be recorded and reported to appropriate levels of management.

The Contractor shall establish and implement procedures for reporting, verifying, analyzing, and correcting failures, including those that occur during development and qualification testing. The procedure shall provide assurance that the cause and mode of each failure are determined that the potential safety and availability implication is evaluated, and that corrective action is taken.

A failure report shall be prepared to identify the failed item and its origin or source of manufacture and shall describe the failure, the test status at time of failure, and the probable cause and mode of failure, and recommended corrective action.

Failure to confirm to the specified requirements will result in the issuing by the Engineer of a Corrective Action Request. Failure to rectify the deficiencies covered by a Corrective Action Request within the periodstated will result in the Engineer invoking the provisions of GCC.

C3.5.1.5 Design revision and substitution of material

Any revision affecting the design and manufacturing of the *Works*, or any substitution of materials that is deemed necessary shall be notified by the Contractor to the Engineer for the latter's review and approval.

C3.5.1.4.6 Contractor*'s* responsibility

Acceptance by the Engineer of the Contractor*'s* quality assurance programme, quality plans and inspectionand test plans, or of those of his Sub-contractors will not relieve the Contractor of his obligation to providegoods and services which meet the requirements of the Contract.

C3.5.1.4.7 Environment

The Contractor shall strictly comply with the requirements of the EMP issued for this *Works*. He shall be liable for any damages/destruction to the environment including penalties that will be imposed by the relevant government agency arising from non-compliance of the requirements of EMP occasioned in anymanner by his acts or neglect, or his agents, employees, or workmen in the execution of the *works*.

C3.5.1.4.8 Accommodation of traffic on public roads occupied by the Contractor.

The Contractor shall draft a traffic accommodation plan and submit to the Engineer prior to the commencement of work on any road. The approval by the Engineer shall not relieve the Contractor of anyof his responsibilities or obligation in terms of the legislation and plan.

C3.5.1.4.9 Other Contractors on site

The Contractor needs to take note that other contractors may also be working on the same site and allowtherefore in his planning/work scheduling.

C3.5.1.5 Testing, completion, commissioning, and correction of defects

C3.5.1.5.1 General requirements

The Contractor shall be responsible for conducting all testing as described herein. Work under this section shall include all labour, materials, and support services required to completely testall hardware and software.

If a type of equipment does not meet the specifications or requirements as stated in these Specifications or the System Design Document, it shall be the Contractor's responsibility to correct the problem in all units of that equipment furnished, at no additional cost to the Employer.

All the components, sub-systems, interfaces and systems processes constituting the works shall be tested individually and together to demonstrate that they meet the contract requirements and provide a system that functions in accordance with the contract

The Contractor shall be responsible for the performance of all the tests described below to satisfy the objectives of each testing phase as determined by the Engineer.

The Employer shall have the right to witness all tests.

Test plans shall be submitted to the Engineer a minimum twenty-one (21) days prior to the planned start of testing. Testing shall not commence until the plans have been approved.
Unless otherwise specified, all test plans shall include at a minimum the following:

- Overview of test including test objectives
- Pass/fail criteria
- Traceability matrix listing of all requirements and specifications from the Contract that are included/to be verified in the test and their cross-reference to the Specifications and System Design Document.
- Test setup and test measuring equipment (including descriptive diagrams)
- Listing of tools, test applications, simulators, etc. required to perform the test
- Entry/start-up conditions
- Exit/closing conditions
- Test procedures and scripts to be executed
- Test recording form
- Test comments form
- Signatures and verification form

The Employer reserves the right to direct, at no additional cost, the following changes to the test plans:

- The addition of procedural changes and other reasonable tests to reasonably assure System performance and conformance.
- Investigation into any apparent troubles or anomalies with respect to the System
- An audit of all test reports and verification of any or all previous tests and Measurements.

The Contractor shall provide written notification of readiness to test for all required test stages a minimum of two (2) weeks in advance of the testing.
Upon successful completion of any test, the Contractor shall prepare and submit within two (2) weeks a report summarizing the results with relevant test records appended. All such test reports will be reviewed by the Engineer.

C3.5.1.5.2 Test suspension criteria and defect resolution

The Contractor shall maintain a database of and shall track the status of all defects.

The Contractor shall develop and maintain a standard set of regression tests for each device or subsystem. Regression tests shall be run for any affected device or subsystem if any testing is halted and restarted in accordance with the requirements of the defect resolution.

C3.5.1.5 Training

C3.5.1.5.1 General

The Contractor needs to take note that the Employer aims to use the infrastructure contracts to expose students from various institutions to construction activities as part of their training programme. Full support needs to be provided by the Contractor in this programme to obtain maximum benefits for the students allocated to the contract.

The Contractor shall be responsible to train the Employer's designated personnel according to the requirements specified herein. The Contractor shall be responsible for the supply of all training materials including, at a minimum:

a) Training setups of equipment, including mounting and all power supplies and simulators required to simulate normal operation.
b) Instructor guides.
c) Student guides.
d) Operations manuals.
e) Training presentations.
f) Training handouts.
g) Quick reference guides.
h) Interactive videos or demonstrations.
i) Course and instructor comments sheets.

A Training Program shall be developed and submitted a minimum forty-five (45) days before delivery of training materials that describes:

- Each course to be conducted.
- An overview of delivery methods for each course, including hands-on and group work experience.
- The course objectives for trainees.
- An evaluation plan, including criteria for success of the course, based upon the goals and objectives, and evaluation steps and instruments to be employed.
- A proposed schedule for each class, keyed to the installation process and constrained by availability of trainees away from regular duties.
- A plan for developing or customizing course material.
- Resumes of personnel proposed to be trainers for each class, demonstrating that they are experienced, effective training professionals.

Training shall include course development, providing instructors, and supplying all handouts, materials, classroom aids, etc. required to conduct the training. Training shall take place at the site facilities. Practical training on equipment shall occupy a significant portion of all training classes. The training presentations and material shall be in English.

C3.5.1.5.2 Recording of weather

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

C3.5.1.5.3 Format of communications

All Contract communication shall be in English and in writing (letters, faxes, and electronic mail).

C3.5.1.6 Key personnel

The Contractor shall be required to allocate sufficiently experienced personnel to execute the Contract successfully.

C3.5.1.7 Management meetings

The Contractor and such other persons as may be nominated by the Engineer shall be required to attend periodic site meetings, the date and place for which will be set by the Engineer in consultation with the *Employer* and Contractor.
A main purpose of the site meetings will be to review and discuss progress and programme, and all persons attending the site meetings must be empowered to act on behalf of the firms they represent.

C3.5.1.8 Forms for contract administration

The Contractor shall maintain a file or files (hard copy and electronically) per Contract project, which shallcontain:

- the details of the Sub-contractors, if any;
- project programme, with commencement and completion date;
- procurement information;
- progress reports, minutes, letters, faxes, emails of all project or project related correspondence;
- record documentation, reports, designs, and drawings;
- a copy of the Health and Safety Plan and the Environmental Management Plan;
- record of cost implications, variations, claims and disputes; and
- empowerment records.
- copy of quality (QMS) plan and all related documentation/procedures.

At the end of this Period of Performance the Contractor shall hand-over such hard copy files to the *Employer*, including all electronic records, documentation, reports, designs, and drawings.

C3.5.1.9 Daily records

The Contractor is to provide a site diary, which is to be kept on site, for the purpose of keeping daily records in respect of work performed on the site. This shall be made available to the Engineer upon request.

C3.5.1.10 Bonds and guarantees

If the Tenderer, when notified of the acceptance of his tender, fails to provide a guarantee within the period stipulated in the Contract Data and the *Employer* elects to cancel the contract on that ground, the*Employer* may demand a sum of R1 000 per day, or the *Employer* may take other action whether by way ofa claim for loss or damage suffered by the *Employer* arising out of such breach.

C3.5.1.10 Payment certificates

The Contractor shall be required to complete a progress report before he will be allowed to complete thestandard payment certificate required to be submitted with his tax invoice.

C3.5.1.10.1 Measurement of work for payment

All measurements for the purpose of payment shall be made by the Contractor and accepted by the Engineer. The Contractor shall be responsible for obtaining the Engineer's acceptance not later than oneweek after the measurements have been made.

C3.5.1.11 Permits

The Contractor shall acquire all permits, approvals and/or licenses from all local or national government authorities or public service undertakings in South Africa and abroad, which such authorities or undertakings require the Contractor to obtain and which are necessary for the performance of the

Contract, including without limitation, visas for the Contractor*'s* and *Sub*-Contractor's personnel and entry
permits for all imported Contractor*'s* plant and equipment.

C3.5.1.12 Lock-out procedure

Lock-out systems consist of isolation of electrical, hydraulic, pneumatic, mechanical systems and isolating valve and pipeline systems. Where the Contractor uses his own procedure, this procedure will be forwarded to the Engineer for review prior to commencement of work.
A lock-out procedure shall be available at all electrical distribution boards. Valves isolated shall be locked and the Contractor shall be in possession of the keys. The Contractor and his employees shall be trained in accordance with this procedure and declared competent by the Contractor to lock out electrical equipment. They shall always adhere to the procedure's requirements.

C3.5.1.13 Permit to work

A system shall be implemented to control identified high risk activities. The Contractor shall ensure that the proper permit is issued as agreed upon and authorized by an appointed competent person before commencing with the work.
Some of the activities that may require a permit to work within a construction or plant area are:

- Cold work in areas where operational plant or equipment can pose a threat
- Radiographic works
- Working in confined spaces
- Excavation work (cable clearance permit)
- Blasting
- Piling
- Work being done within 50 m of an overhead power line
- Use of a hazardous substance, e.g. lead

Contractors are to ensure that all personnel who will be signing on work permits within the Site are trained in the work permit procedures and declared competent.

C3.5.1.14 Use of documents by the *Employer*

All information (communications, designs, drawings, documents, or reports) provided to the *Employer* by the Contractor, in the course of performing the service required for this Contract, are intended to ensure that the projects are implemented successfully.

C3.5.1.16. Property provided for the service provider's use

The Contractor shall provide all physical resources, including properties, for the successful execution of the project.

C3.5.1.17 Proof of compliance with the law

The Contractor shall ensure that he complies to all prevailing legislation that applies to the provision of his services as part of this Contract and indemnifies the *Employer* where he deliberately neglects compliance with such legislation.

C3.6 HEALTH AND SAFETY

The following particular and generic specifications are applicable to this contract.
(1) Occupational Health & Safety

C3.6.1 HEALTH AND SAFETY REQUIREMENTS AND PROCEDURES

C3.6.1.1 Framework for an occupational health and safety plan

C3.6.1.1.1 Introduction

The Principal Contractor must demonstrate to the Employer that it has a suitable and sufficientlydocumented Occupational Health and Safety plan as well as the necessary competencies, experience and resources to perform the construction work safely. The Principle Contractor could be required to submit the following documentation for perusal and verification by the Employer:

- Management structure.
- Quality plan.
- Human resources plan.
- Registered workplace skills plan.
- "Letter of good standing" from the Compensation Commissioner or licensed compensation insurer.
- Proof of Induction and other training of employees.
- Example copy minutes of previous Occupational Health and Safety Committee meetingsand copies of Incident Investigation reports.

The following specifications are supplied as a guide only. The Employer's Health and Safety Agent may amend and/or expand on the specifications by means of an addendum to Tender orafter the award of the Contract.

C3.6.1.1.2 OH&S plan at tender stage

Tenderers shall submit an OH&S plan with their tender document. This shall be a preliminaryplan that may be expanded on and finalised after the award of the contract. The OH&S Plan should be based on the following principles:

- A proper risk assessment of the construction work.
- Pro-active identification of potential hazards and unsafe working conditions.
- Informing and/or training of employees in hazards and risk areas.
- Provision of a safe-working environment and safety equipment.
- Ensuring the safety of sub-Contractors through their safety plans.
- Monitoring the health and safety on the construction works on a regular basis.
- Using competent safety officers.

C3.6.2 Contents of an occupational health and safety

plan C3.6.2.1 Occupational Health and Safety

Management Programme

- Management of Occupational Health and Safety risks.
- Occupational Health and Safety structures and appointments.
- Programme of Occupational Health and Safety inspections.
- Occupational Health and Safety Representatives.
- Occupational Health and Safety committee.

C3.6.2.1.1 Communication and management of the work

- Management structure and responsibilities.
- Details of the construction supervision and his appointed assistants.
- Details of the Construction Safety Officer.
- Occupational Health and Safety goals for the project and arrangements for monitoring andreview of Occupational Health and Safety performance.
- Arrangements for:
  - Regular liaison between parties on site.
  - Consultation with the workforce.
  - The exchange of design information between the Employer, designers, supervisorsand Contractors on site.
  - Handling design changes during the project.
  - Selection and control of Contractors.
  - The exchange of Occupational Health and Safety information between all Contractors.
  - Security.
  - Site induction and onsite training.
  - Facilities and first-aid.
  - The reporting and investigation of accidents and incidents.
  - The production and approval of risk assessments and method statements.
  - Site OH&S rules.
  - Fire and emergency procedures.
  - Reporting to the Employer i.e. results of Occupational Health and Safety inspections,incident and incident investigations and committee meetings.
  - Reporting of incidents to the Department of Labour and Compensation insurer whereappropriate.

C6.2.1.2 Arrangements for controlling significant site risks

The following are some examples of the arrangements for controlling the most significantsite risks:

C3.6.2.1.3 Safety risks

- Services, including temporary electrical installations.
- Preventing employees from falling into excavations, from trucks etc.
- Work with, on or near fragile materials.
- Control of lifting operations.
- The maintenance of plant and equipment.
- Traffic routes and segregation of vehicles and pedestrians.
- Traffic control during pipeline crossing of existing roads.
- Handling and storage of hazardous materials.
- Dealing with existing unstable structures/land.
- Working in confined spaces.
- Working at elevated heights (> 3,0 m).
- Other significant safety risks as and when identified.
- Working in excavations to a depth of 7,0 metres.

C3.6.2.1.4 Health risks

- Working environment.
- Handling, storage and use of hazardous chemical substances.

- ☐ Dust containing cement, silica and other hazardous substances.
- ☐ Dealing with contaminated land or material.
- ☐ Manual handling.
- ☐ Reducing noise and vibration.
- ☐ Provision of adequate lighting.
- ☐ Ventilation considerations.
- ☐ Extreme heat and cold temperature considerations.
- ☐ Dealing with HIV/Aids and other illnesses.
- ☐ Provision of and maintaining ablution and eating facilities.
- ☐ Other significant health risks as and when identified.

C3.6.2.1.5 Special risks

Contractors are to take note of the special risks that may be encountered during the projectand to include these special risks in the OH&S plan.

C3.6.2.1.6 Working environment

- ☐ Rotating machinery (and pumps if required).
- ☐ Electrical infrastructure not indicated on “As Built” drawings.
- ☐ Electrical storms during summer months.
- ☐ Traffic control during pipeline crossings of existing roads.

C3.6.2.1.7 Installation work

- ☐ Use of electricity may be hazardous in wet conditions.
- ☐ Working space may be limited.
- ☐ Lifting and placing of heavy equipment, pipes and manhole rings and covers.

C3.6.2.1.8 Preparation of an occupational health and safety operational reference file/manual

The Principle Contractor shall open and maintain an OH&S file for the duration of the contract. On completion of the contract the Principle Contractor shall hand the OH&S file tothe Employer.

C3.6.2.1.9 Following are some of the requirements to be addressed

- ☐ Layout, format and content requirements.
- ☐ Arrangement for the collection and gathering of information.
- ☐ Storage and archiving of all the information.
- ☐ Copy to the Client at completion of project.
- ☐ Appointment of a health and safety officer in writing.

C3.6.2.1.10 Contents of an OH&S file/manual

- ☐ OH&S Policy.
- ☐ Notice of new project.
- ☐ Site start-up.
- ☐ Security measures.

- ☐ Written designations and appointments.
- ☐ Arrangements with Contractors / mandatory's
- ☐ OH&S rules and procedures.
- ☐ Induction.
- ☐ OH&S training.
- ☐ OH&S promotion.
- ☐ OH&S representatives.
- ☐ OH&S committees.
- ☐ Workplace facilities e.g. ablutions, sheltered eating areas etc.
- ☐ Protective equipment.
- ☐ Workplace inspections and audits.
- ☐ Investigation and reporting of incidents/accidents.
- ☐ Mechanical safeguarding.
- ☐ Electrical safeguarding.
- ☐ Safeguarding against trench excavations with depths ranging between 2 to 7 metres.
- ☐ Safeguarding against hazardous substances.
- ☐ Lifting machinery and equipment.
- ☐ Construction vehicles and mobile plant.
- ☐ Welding, heating and flame cutting.
- ☐ Protection of the environment affected by construction activities.
- ☐ Keeping of records in terms of the OH&S Act (85 of 1993).
- ☐ General details of construction methods and materials used.
- ☐ Details of equipment and maintenance facilities within the structures.
- ☐ Maintenance requirements and procedures for structures / equipment / plant.
- ☐ Manuals produced by suppliers and specialist Contractors, including operating and maintenance procedures and schedules for plant and equipment.
- ☐ Details of the location and nature of utilities and services, including emergency and fire-fighting systems.

(a) Construction Regulations, 2003

The Contractor shall be required to comply with the Occupational Health and Safety Act, 1993: Construction Regulations, 2003 (the regulations) as promulgated in Government Gazette No 25207 and Regulation Gazette No 7721 of 18 July 2003. (Not included in this Volume). Non-compliance with these regulations, in any way whatsoever, will be adequate reason for suspending the Works.

The proposed type of work, materials to be used and potential hazards likely to be encountered on this Contract are detailed in the Project Specifications, Schedule of Quantity and Drawings, as well as in the Employers' health and safety specifications (regulation 4(1)) of the Construction Regulations 2003, which are bound in the Contract document

The Contractor shall in terms of regulation 5(1) provide a comprehensive health and safety plan detailing his proposed compliance with the regulations, for approval by the Employer.

The Contractor shall at all times be responsible for full compliance with the approved plan as well as the Construction Regulations and no extension of time will be considered for delays due to non-compliance with the

abovementioned plan or regulations.

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

C3.6.2 PROTECTION OF THE PUBLIC

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

C3.6.3 BARRICADES AND LIGHTING

All excavation must be marked with drum, reflecting tape and warning signs to satisfaction of the engineer and OHS appointed official.

PS11 APPLICABLE STANDARDIZED SPECIFICATIONS

1. CONSTRUCTION

1.1 STANDARD SPECIFICATIONS

The following relevant standardised specifications, as listed below, shall form the Standard Specifications and apply to this contract:

The **COLTO Standard Specifications for Road and Bridge Works for State Road Authorities 1998**, prepared by the Committee of Land Transport Officials, which the Tenderer shall obtain / purchase from the South African Institution of Civil Engineering (SAICE), Private Bag X200, Halfway House 1685, Tel: (011) 805 5947, Fax: (011) 805 5971, e-mail: civilinfo@saice.org.za.

This COLTO Standard Specification may also be inspected, by appointment, at the offices of the Employer and the Consulting Engineers during normal office hours.

2. STANDARD SPECIFICATIONS

Where reference is made to the standard specifications in this contract, it shall mean the **COLTO Standard Specifications for Road and Bridge Works for State Road Authorities 1998**, prepared by the Committee of Land Transport Officials complete with any corrections and amendments applicable at the time of tendering. Amendments to the standard specifications are bound in the contract documents in Part B: Project Specifications.

3 WAYLEAVES, PERMISSIONS AND PERMITS

The Contractor shall be responsible for obtaining all of the necessary wayleaves, permissions or permits applicable to working near any existing services or other infrastructure on Site, and shall ensure that any wayleaves, permissions or permits obtained by the Employer's Agent prior to the award of the contract are transferred into the Contractor's name.

The Contractor shall abide by any conditions imposed by such wayleaves, permissions or permits.

The Contractor shall ensure that all wayleaves, permissions and permits are kept on site and are available for inspection by the relevant service authorities on demand.

The Contractor shall also ensure that any wayleaves in respect of electricity services are renewed timeously every three months.

4 CONSTRUCTION EQUIPMENT

The Contractor is to provide in the contract for the following plant, but are not limited to:

- Pneumatic rollers (22 ton)
- Steel drum rollers (3,5 and 8 ton)
- TLB
- Tipper trucks (10 m^3)
- Concrete breakers

5 EXISTING SERVICES

The following known services are located on the construction site:

- Telkom
- Municipal Electrical
- Eskom
- Municipal water, Sewer and Stormwater

It is the Contractor's responsibility to locate, mark, record and protect such services. Service owners must be contacted as per section 2 above. The Contractor will be held responsible for damage to all services, known and unknown, and for specific requirements when working in close proximity to services.

6 SITE ESTABLISHMENT

Services and facilities provided by the Employer

No facilities will be provided for by the Employer for site camp establishment. Requests for permission to occupy land must be made and approved by the relevant land-owner or authority before such land is occupied. The Contractor is to make provision for water, electricity, telecommunication services, ablution facilities, accommodation, medical and first aid facilities, fire protection, back-up generators and any other services as required. The Contractor is to clean and make good the site camp to the same standard or better than the condition they were before the Contractor first made use of them, fair wear and tear excluded. The Contractor will continuously clear and dispose of waste and surplus materials to maintain the site in a tidy state.

The Contractor is provide construction camps and offices for the due and proper fulfilment of the contract and those facilities for use by the Employer and his agents. The facilities will remain the property of the Employer, if paid for under item 1400 of the Project Specifications, unless agreed otherwise.

The location and setting out of the site camps and offices must be approved by the Employer or his agent before establishment commences.

The facilities, site camps and offices may not be located within the road reserve.

7 ALTERATIONS, ADDITIONS, EXTENSIONS AND MODIFICATIONS TO EXISTING WORKS

It's the Contractors responsibility to familiarise himself with the dimensional accuracy, alignment, levels and setting out of existing structures or components and consequently compatible with the proposed works and procedures. The Employer's representative shall be notified if this is not the case.

"The cost of alterations to services necessitated by the construction of the road will be borne by the Employer.

The Contractor shall allow all reasonable access to any authority or department for the purpose of maintaining, laying and/ or altering any service cables or mains during the construction period.

H8 Owing to the possible inaccuracy of records of existing services (water mains, electric cables, telephone cables, etc.) the Contractor shall locate by means of specialized

equipment the services that may be affected by this contract prior, to the commencement of excavations.

Payment for the exposure of services by excavation will be on the basis of the tendered rates.

H9 The Contractor shall not damage adjoining fences and buildings when depositing spoil and/ or materials. All claims arising from such causes shall be settled by the Contractor. The Contractor shall prevent damage to buildings, fences and other objects in the vicinity of the Works, as a result of the execution of this Contract. The Contractor shall supply and erect shoring, screens, barricades, temporary supports and other items necessary for preventing such damage."

7 INSPECTIONS OF ADJOINING PROPERTIES

As this project entails only working within the existing road reserve which provides and adequate buffer, no detrimental effects are foreseen to any properties within close proximity of the working site. It is however the Contractors responsibility to monitor all operations and ensure that no damage is done to adjoining properties due to construction activities.

8 SURVEY CONTROL AND SETTING OUT OF THE WORKS

It is a specific requirement of this Contract that the Contractor will have to establish his own reference and control beacons for the setting-out and control of the works. The position of the works shall generally be as indicated on the drawings but shall be confirmed on site by the Engineer. Survey work will not be measured and paid for directly and compensation for any work involved in staking or setting out will be deemed to be covered by the rates tendered and paid for the various items of work included in this Contract.

9 SEQUENCE OF THE WORKS

The staging of construction should be planned such that there is minimal that traffic disruption.

10 METHODS AND PROCEDURES

The Contractor shall address the following procedures:

- The Contractor shall submit details of his temporary Works, planned traffic accommodation and all other items required for the Works to the Engineer for review and acceptance.
- The Contractor shall submit to the Engineer samples and test results of all materials to be used in the Works and which are to be supplied by the Contractor. The tests are to be done on dedicated materials earmarked to be incorporated into the works. The Contractor shall request approval for the use of the material from the Engineer before incorporation into the Works. If accepted, the samples so submitted will be kept by the Engineer as standards for the duration of the Contract. No material inferior in quality, workmanship or appearance to the accepted samples shall be used.
- All alternative material not defined herein or COLTO proposed by the Contractor shall be tested for acceptability by the Contractor and the results of the test made available to the Engineer. All such material will then require the approval of the Engineer.
- The costs of all tests shall be borne by the Contractor
-

11 QUALITY PLANS AND CONTROL

The Contractor shall implement a quality assurance system that replicates an ISO 9001 and appoint a quality manager who shall ensure that members of the Contractor's staff comply with the requirements of the quality system. The quality system and the methods used to implement it shall be described in a quality plan produced by the Contractor.

The Contractor shall submit the quality assurance system he proposes using to the Engineer, for his approval, within two weeks of the site handover. The system shall record the lines and levels of responsibility and indicate the method by which testing procedures will be conducted. Once accepted by the Engineer, the Contractor shall not deviate from it unless written notification of proposed changes have similarly been submitted and approved.

The system shall provide for a method statement for each construction activity for which a pay item is provided in the Pricing Schedule. Each method statement shall be submitted to the Engineer for his approval two weeks prior to commencement of the activity. Where appropriate the Contractor shall make use of the Employer's manuals in preparing his method statements. No construction activity shall commence before the Engineer has approved the Contractor's quality assurance system."

The following must be included in the Quality Management System:

- Quality Plan for the contract
- Quality Policy
- Index of Procedures to be used
- A schedule of internal and external audits during the contract

The Engineer indicates those documents required to be submitted for either information, review or acceptance and the Contractor indicates such requirements within his register of documents. The register shall indicate the dates of issue of the documents with the Engineer responding to documents submitted by the Contractor for review or acceptance within the period for reply prior to such documents being used by the Contractor.

12 ACCOMMODATION OF TRAFFIC ON PUBLIC ROADS OCCUPIED BY THE CONTRACTOR

The Contractor shall submit details of his temporary Works, planned traffic accommodation (road traffic management plans) and all other items required for the Works to the Engineer for review and acceptance.

Construction to be done during the daytime with lane closures in place. The road will accordingly be closed in half widths for the respective section under construction with viable detour routes at intersections. Daytime construction, according to the hours set out under B1204, will be carried out to limit the inconvenience to the road user. The proposed traffic accommodation layout for daytime closures which will be provided to the Contractor, shall form part of the set of drawings.

13 OTHER CONTRACTORS ON SITE

There will be no other contractors on site. Municipal contractors performing emergency roadworks or any other work within the road reserve will have right of way. The Contractor should make adequate provision within his programme to accommodate any delays as a result.

14 TESTING, COMPLETION, COMMISSIONING AND CORRECTION OF DEFECTS

The work to be done by the Completion Date

On or before the Completion Date the Contractor shall have done everything required to provide the Works including the work listed below which is to be done before the Completion Date and in any case before the dates stated. The Engineer cannot certify Completion until all the work listed below has been done and is also free of Defects, which would have, in his opinion, prevented the Employer from using the Works and others from doing their work.

Item of work	To be completed by
As-built drawings of the completed pavement layers and surfacing levels and material results	At least 7 days prior to completion.
Complete process control and acceptance testing results that proves the Works compliance, in accordance with the Provision of Sections 8100, 8200 and 8300 of the COLTO Specifications.	At least 7 days prior to completion
Site snag list Inspection completed by the *Engineer* or his designated representatives.	At least 21 days prior to completion

The Contractor is permitted to carry out the following Works after completion:

- Items identified as snag list items during the Completion Inspection.
- Provision of materials, facilities and samples for tests and inspections.

The Contractor provides the following:

- The Contractor is to provide all materials, facilities and apparatus required for any test and /or inspections required by the Works Information.
- The Contractor is to provide samples as required by the Works Information.

15 RECORDING OF WEATHER

Recording of weather data (temperature, rainfall and wind) is the responsibility of the Contractor and will be agreed with the Engineer. The Contractor shall submit to the Engineer claims for all time lost due to inclement weather within 1 working day of the claim day. A record of inclement weather shall be kept by the Contractor and recorded at site meetings on a regular basis. The onus is on the Contractor to prove these claims.

16 FORMATS OF COMMUNICATIONS

Different types of communications used:

- Site instructions
- Requests for inspections
- Weekly and monthly meetings
- Email correspondence

17 KEY STAFF

The Contractor shall provide an organogram and CVs of his key staff and their line of authority and communication for approval by the Engineer.

18 MANAGEMENT MEETINGS

The Contractor shall attend management meetings at the Engineer's request. It is envisaged that at least monthly contract management meetings will be held.

The Contractor will also be required to attend a safety meeting once a month. The Contractor will also attend a kick-off meeting and a close off meeting. The Contractor will be required to present all relevant information including early warnings of compensation events (claims), quality plans, schedules, (including progress), subcontractor management, and health, environmental and safety issues at such

meetings.

All meetings are to be recorded using minutes or a register prepared and circulated by the person who convened the meeting. Such minutes or register are not to be used for the purposes of confirming actions or instructions under the contract as these are to be done separately by the person identified in the conditions of contract to carry out such actions or instructions.

19 FORMS FOR CONTRACT ADMINISTRATION

Forms for contract administration will be supplied by the Contractor for approval before the Works commence.

20 ELECTRONIC PAYMENT

Contractors' invoices:

- The Contractor is paid by electronic bank transfer within the period stated in the Contract Document for performance of work.
- The Contractor provides the Employer with his correct banking information to make the transfer.
- All payments are provisional and subject to audit.
- The Contractor preserves its records for such a period as the Department of Internal Revenue may require, but in any event for not less than five years.

21 DAILY RECORDS

The Contractor shall keep detailed daily records of all his personnel and plant engaged on Site and the working areas (including subcontractors) with access to such daily records being available for inspection by the Engineer at all reasonable times.

A daily site diary will be kept by the Contractor which will be signed off by the Engineer's Representative. The diary will include the following: plant on site, weather data, site instructions, personnel on Site, drawings received, progress, production, main activities and incidents on Site.

22 PROJECT SPECIFICATIONS REFERRING TO COLTO STANDARD SPECIFICATIONS

Amendments to the standard specifications are included in this Section: Project Specifications.

(i) The Project Specifications form an integral part of the contract documents and supplement the standard specifications.

(ii) In the event of any discrepancy between the Project Specifications and a part of the standard specifications, the schedule of quantities, or the Drawings, the Project Specifications shall take precedence.

(iii) The standard specifications, which form part of this contract, have been written to cover all phases of work normally required for road contracts, and they may therefore cover items not applicable to this particular contract.

In certain clauses the standard specifications allow a choice to be specified in the Project Specifications between alternative materials or methods of construction and for additional requirements to be specified to suit a particular contract. Details of such alternatives or additional requirements applicable to this contract are contained in this part of the Project Specifications. It also contains some 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 B 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 a 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 B followed by a new number. The new numbers follow on the last clause or item number used in the relevant section of the standard specifications.

PART B: PROJECT SPECIFICATIONS RELATING TO STANDARD SPECIFICATIONS

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

Clauses and pay items referring to labour intensive methods are prefixed by L in the project specifications.
Clauses and pay items referring to emerging contractors are prefixed by E in the project specifications. As much as is economically feasible all work shall be implemented by employing Labour Intensive Construction methods. Over and above the normal Building and Allied works to be implemented by employing skilled and unskilled labour the works specified in the "Guidelines for the Implementation of Labour-Intensive Infrastructure Projects under the Expanded Public Works Programme (EPWP)" shall be undertaken using Labour Intensive Construction methods.

The standard specifications that form part of this contract have been written to cover all phases of work normally required for road contracts and may therefore cover items of work not applicable to this particular contract.

Applicable COLTO 1998 Standard Specifications for Road and Bridge Works for State Road authorities

4.1 The applicable COLTO Standardised Specifications for Civil Engineering Construction for this contract shall be the following:

1200	-	General Requirements and Provisions
1300	-	Contractor's Establishment on Site and General Obligations
1500	-	Accommodation of Traffic
1600	-	Overhaul
1700	-	Clearing and Grubbing
2100	-	Drains
2200	-	Prefabricated Culverts
2300	-	Downpipes and Concrete Linings for Open Drains
3100	-	Borrow Material
3300	-	Mass Earthworks
3400	-	Pavement Layers of Gravel Material
3500	-	Stabilization
5100	-	Pitching, Stonework and Protection against Erosion
5200	-	Gabions
5600	-	Road Signs
5700	-	Road Markings
5800	-	Landscaping and Planting Plants
7300	-	Concrete Block Paving for Roads
8100	-	Testing Material and Workmanship

Note 1 The Standard Specifications are not bound into the tender and contract documents but are available at the Tenderer's/Contractor's expense from the South African Institution of Civil Engineering (SAICE), Private Bag X200, Halfway House, 1685.

Note 2 Each of the Standard Specifications contains an appendix, which in turn lists further specifications which are not bound into the tender and contract documents.

Note 3 Both of the Standard Specifications, as well as those specifications that are listed in the appendix to the Standard Specifications, shall apply to the Contract to the same extent as if each of these specifications had been bound into the tender/contract documents.

4.2 Variations and Additional Clauses to the Standard and Particular Specifications

The following variations and additions to the Standard and Particular Specifications will be applicable to this Contract.

The various documents listed in Section 4.1 shall be treated as mutually explanatory. However, should any requirements of Section 4.1 conflict with any requirement in the Standardized Specifications or with any requirement of the Particular Specifications, then the requirements of Section 4.2 shall prevail.

The Contractor shall make suitable arrangements for process control prior to commencement with the Works. Should he intend using site personnel for this purpose he 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 in terms of Clause 5.11 of the Conditions of Contract (2010), or for him to recommend termination to the Employer in terms of Clause 9.2 thereof.

PORTION 2: VARIATIONS AND ADDITIONAL CLAUSES

PS6 SITE FACILITIES AVAILABLE

PS6.1 Contractor's Camp

A site will be made available for the Contractor's camp or depot, to be located adjacent to the works. The Contractor shall be entirely responsible for ensuring that his establishment meets the requirements of any Municipal regulations or by-laws, which may be applicable and shall include therefore in his tendered rates.

The Contractor shall also be responsible for ensuring that unauthorised persons do not have access to the site or any construction material stockpiles.

PS6.2 Source of Water Supply

Water is available on the site. The Contractor shall make all arrangements with the Local Authority for a water connection and include for the payment of water used for construction purposes in his tendered rates.

PS6.3 Source of Power Supply

The Contractor will however be entirely responsible for arranging a power connection and for payment for all electric power required for construction purposes if electric power is available on site. The costs of electric power are to be included in the Contractor's tendered rates.

PS6.4 Housing

The Contractor shall be permitted to house Key Personnel only within his camp site(s). At the commencement of the Contract, the Contractor shall inform the Engineer of his intentions regarding the housing of Key personnel on Site and he shall thereafter ensure that all such accommodation is kept neat and tidy, hygienic and properly controlled at all times. Should at any stage of the Contract the Employer and/or the Engineer be of the opinion that the housing of Key Personnel within the camp site(s) of the Contractor is causing disturbance or inconvenience to the landowner or to nearby residents, then the authority granted by this clause for the Contractor to
house Key personnel on Site may be withdrawn, either partially or entirely.

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

PS6.5 Ablution Facilities

Ablution facilities will not necessarily be available at the camp or depot site and the Contractor shall make his own arrangements in this regard.

PS7 SITE FACILITIES REQUIRED

PS7.1 For the Contractor

Whatever may be required for the satisfactory execution of the Contract.

PS7.2 For the Engineer

Not required.

PS7.3 Sanitary Facilities

Water borne sewerage is not available on site. Chemical or flush toilets with on-site disposals shall be provided and maintained for the use of the Contractor's personnel, the Engineer and representatives of the Employer at all camp sites that the Contractor may establish for construction of the Works. In addition, the Contractor shall at all times during construction of the works provide adequate sanitary facilities.

PS8 FEATURES REQUIRING SPECIAL ATTENTION

PS8.1 Existing services

The site of the Works is traversed by various existing services including water, sewers, and electricity cables, the exact position of which are generally unknown. Where positions of services are known these will be shown on layout plans or information in this regard will be made available by the engineer prior to construction commencing in an area. The contractor will be required to so schedule and programme his work that when works are disrupted due to the influence of unexpected services encountered, construction can continue in other portions to allow the situation to be remedied by re-routing of new or existing services.

PS8.2 Other Contractors

The Contractor must prepare himself to work with other Contractors in the same project location and/or on the same site simultaneously. The Contractor must make adequate provision for himself in the rates tendered to protect and clearly mark "his" works, to accommodate other Contractors and to liaise constantly and adequately with the other persons active in the same area.

It might happen that up to five different contractors will be active on site, that routine maintenance are carried out on the existing work by another party and that the Client or his agent is active onsite with the day to day running of the works.

PS8.3 Preservation of trees

Special care shall be taken that only designated trees are removed and that no damage is caused to other trees during construction.

PS8.4 Safeguarding reference beacons

The Contractor shall take special care to safeguard any permanent survey beacons such as erf corner pegs, reference beacons and level beacons. Should such pegs or beacons be disturbed, the Contractor shall have them replaced by a registered Land Surveyor at his own cost. The Surveyor shall submit the necessary documentation regarding the replacement of pegs and beacons to the Engineer for approval.

The Contractor's attention is drawn to Article 35(1) of the Land Surveying Act No. 9 of 1927, (as amended) in this regard.

PS8.5 DISPOSAL OF MATERIAL

All surplus or unsuitable materials arising from any excavations, rocks, trees, debris and other unsightly material shall be disposed of at an approved municipal landfill site or approved borrow pit.

The Contractor shall be responsible to make his own arrangements for a suitable spoil site.

B: AMENDMENTS TO THE STANDARD SPECIFICATIONS

The following references from, and variations and additions to the Standard Specifications will be valid for this Contract.

The clauses and pay items in this portion of the Particular Specifications are numbered "B" followed by a number corresponding to the number of the relevant clause or pay item in the Standard Specifications. New clauses and pay items not covered by clauses or pay items in the Standard Specifications, if included here, are also designated "B" followed by a number. These numbers follow on the last clause or pay item number used in the relevant section of the Standard Specifications.

SECTION 1200: GENERAL REQUIREMENTS AND PROVISIONS

Add the following:

PROJECT SPECIFICATIONS REFERRING TO COLTO STANDARD SPECIFICATIONS

TABLE OF CONTENTS

COLTO SERIES 1000: GENERAL

SECTION B1100 : DEFINITIONS AND TERMS

B1115 GENERAL CONDITIONS OF CONTRACT

Replace Clause 1115 with the following:

The General Conditions of Contract for Construction Works (2ND Edition) 2015 published by the South African Institute of Civil Engineering, together with the Special Conditions of Contract form part of the contract.

All references in the COLTO Standard Specifications for Road and Bridge Works are to the COLTO General Conditions of Contract for Road and Bridge Works for State Road Authorities. Consequently, all references in the COLTO Standard Specifications have to be amended accordingly to reflect the appropriate General Conditions of Contract relevant for the Contract. The COLTO Standard Specifications have been scrutinized and the clauses, which refer to the COLTO General Conditions of Contract, identified. Each COLTO clause reference is tabulated in Table 1115/1 below (context of reference is also given) together with the relevant equivalent clause in the SAICE General Conditions of Contract for Construction Works applicable for this contract.

Whereas every effort has been made to include all of the affected clauses in the table, there may be some omissions. In every case, however, the SAICE General Conditions of Contract for Construction Works, as amended by the Special Conditions of Contract in the Contract Data, shall apply and the Contractor shall be responsible for interpretation of the equivalent clause

TABLE 1115/1: REFERENCES IN COLTO STANDARD SPECIFICATIONS TO THE COLTO GENERAL CONDITIONS OF CONTRACT AND RELEVANT SAICE GENERAL CONDITIONS OF CONTRACT FOR CONSTRUCTION WORKS 2010

COLTO Standard Specification		**COLTO General Conditions of Contract 1998 (GCC)**		**SAICE General Conditions of Contract for Construction Works 2nd Edition 2015**	
Clause No	Page No	Clause No	Description or Reference	Clause No	Description or Reference
1115	1100-2		Definition of GCC		Definition of SAICE
1204	1200-2	15	Construction programme	5.6	Programme of the Works
1204	1200-2		General reference to GCC		Applicable to SAICE
1206	1200-3	14	Setting out of works		Omitted
1209(a)	1200-4		General references to GCC		Applicable to SAICE
1209(e)	1200-5	52(2)	Valuation of material brought onto site	6.10.2	Valuation of material brought onto site
1210	1200-5	54	Certificate of practical completion	5.14	Certificate of Practical Completion
1212(1)	1200-7	49 (2)	CPA on alternative designs	6.8.2	CPA on alternative designs
1215	1200-9	45	Extension of time for completion due to abnormal rainfall.	5.12r	Extension of time for completion due to abnormal rainfall.
1217	1200-10	35	Care of the works	8.2	Care of the works
1303(ii)	1300-1		General reference to GCC		Applicable to SAICE
1303(iii)	1300-1	49	Price adjustment Item 13.01 (a)	6.8	Price adjustment Item 13.01 (a)
1303 (iii)	1300-2	49	Price adjustment Item 13.01 (b)	6.8	Price adjustment Item 13.01 (b)
1303 (iii) 1303 (iii)	1300-1 1300-2	53 53	Variations exceeding 20% Variations exceeding 20%	6.11	Variations exceeding 15% Variations exceeding 15%

COLTO Standard Specification		COLTO General Conditions of Contract 1998 (GCC)		SAICE General Conditions of Contract for Construction Works 2nd Edition 2015	
1303	1300-2	12	Payment Item 13.01 (c)	5.2	Commencement of the Works
1303	1300-2	45	Payment Item 13.01 (c)	5.12	Payment Item 13.01 (c)
1403(c) (ii)	1400-4	40 (1)	Variation for rented accommodation	6.4	Variation for rented accommodation
1505	1500-3	40 (1)	Variation for temporary drainage	6.4	Variation for temporary drainage
Item 15.08	1500-8	48	Payment of Provisional Sum	6.6	Payment of Provisional Sum
Item 15.09	1500/8	48	Payment of Provisional Sum	6.6	Payment of Provisional Sum
Item 15.11	1500-8	48	Payment of Provisional Sum	6.6	Payment of Provisional Sum
Note (2)	3100-4	40	Payment for prospecting for materials	6.5.2	Payment for prospecting for materials
3204(b) (iii)	3200-2	40	Payment for oversize material	6.5.237	Payment for oversize material
3303(b)	3300-2	2	Engineer's decisions, with reference to materials classification	3.1	Engineer's decisions, with reference to materials classification
Item 44.06	4400-3		General reference to GCC, PC Sums	6.6.2	Prime Cost Sums
Item 45.06	4500-3		General reference to GCC, PC Sums	6.6.2	Prime Cost Sums
5803 (c)	5800-3	40	Variation, for landscaping	6.4	Variation, for landscaping
5805 (d)	5800-4	40	Variation, for grassing	6.4	Variation, for grassing
Item 58.10	5800-10	48	Payment for Extra Work	6.4	Payment for Extra Work
8103 (c)	8100-1	40	Variation, for testing material	6.4	Variation, for testing material
Item 81.02	8100-26		General reference to GCC, Provisional Sums		Applicable to FIDIC, Provisional Sums
Item 81.03	8100-26	22	Clearance of site on completion, with reference to core drilling	5.15	Clearance of site on completion, with reference to core drilling

The relevant definitions of the SAICE General Conditions of Contract (First Edition) 2004 shall apply to the contract with the following reference to the terms used in the COLTO Standard Specifications:

SAICE General Conditions of Contract (2nd Edition) 2015 : Subclause 1.1 Definitions

Replace Subclause 1.1.1.2 with the following:

"1.1.1.2 "**Bill of Quantities**" means the Schedule of Quantities document so designated in, and forming part of, the Tender. The Schedule of Quantities forms part of the Pricing Data that lists the items of work and the quantities and rates associated with each item to allow the Contractor to be paid at regular intervals an amount equal to the agreed rate for the work multiplied by the quantity of work completed."

Replace Subclause 1.1.1.4 with the following:

"1.1.1.4 "**Contract Data**" means the specific data in the document so designated in, and forming part of, the Tender. The Contract Data together with the General Conditions of Contract and the Special Conditions of Contract, collectively describe the risks, liabilities and obligations of the contracting parties and the procedures for the administration of the Contract."

Replace Subclause 1.1.1.25 with the following:

"1.1.1.25 "**Pricing Data**" means the document that contains the Schedule of Quantities and provides the criteria and assumptions which it will be assumed in the Contract that were taken into account by the Contractor when developing his prices."

Replace Subclause 1.1.1.28 with the following:

"1.1.1.28 "**Scope of Work**" means the document(s) containing the Works Specifications (Standard Specifications, the Project Specifications and other documents) and the Drawings, that specifies and describes the Works, which are to be provided, and any other requirements and constraints relating to the manner in which the work is to be performed."

Add the following new Definitions:

"1.1.1.37 "**Project Specifications**" means any specifications appearing under this heading and forming part of the Contract, and containing any amendments to, omissions from or additions to the Standard Specifications that may be required in connection with a specific project."

"1.1.1.38 "**Special Conditions**" means any addition to, departure from or amendment of the General Conditions of Contract as set out in the Contract Data forming part of the Tender Documents."

"1.1.1.39 "**Works Specifications**" means all specifications forming part of the Contract whether they appear in the Standard Specifications, the Project Specifications or on the Drawings, or be they instructions given to the Contractor, or any other specifications referred to in the above-mentioned Specifications."

B1155 WORK IN RESTRICTED AREAS

Add the following:

"Any omission of payitems from the pricing schedule with regard to additional or extra over payment for work in restricted areas should be regarded as deliberate and any additional cost incurred shall be included in the bulk rates tendered. (Refer also to clause B1209(g))"

B1158 SANS SPECIFICATIONS

Where reference is made in this specification or the standard specifications to SANS specifications, the latest published national standard shall be applicable. Use:

All TMH1 test methods are currently being revised and translated into SANS methods. To check the latest situation regarding publication, go to

www.sabs.co.za and find the Web Store page.

Under "Quick Search Criteria" enter "3001" to get a list of methods published to date.

B1159 AGGREGATE SIZE

Where reference is made in this specification or the standard specifications to aggregate size, nominal aggregate size or maximum aggregate size, the aggregate size as listed shall be replaced with the new corresponding aggregate size as indicated in the following table:

Aggregate size	New aggregate size
26,5	28
19	20
13,2	14
9,5	10
6,7	7
4,75	5
2,36	2
1,18	1

SECTION B1200 : GENERAL REQUIREMENTS AND PROVISIONS

B1201 SERVICES

Add the following after the first paragraph of Clause 1201 of the Specifications:

"Various types of services, both overhead and underground, exist within the boundaries of the site. It is not envisaged that it will be necessary for the Contractor to arrange for the removal, relocation or protection of existing services. Should any work become necessary due to unforeseen circumstances then all work shall be done strictly in accordance with the requirements of the relevant service owner and in accordance with the requirements of these Project Specifications and the Standard Specifications where applicable."

Add the following after the sixth paragraph of Clause 1201 of the Specifications:

"The Contractor's attention is drawn to the relevant clauses of the General and Special Conditions of Contract regarding liability for damage to the works, or property, or injury to persons arising from the construction of the works. His attention is also drawn to Clause 8.6 of the General Conditions of Contract regarding insurance to be effected by the Contractor. Special attention is drawn to the exclusions in this insurance policy and particularly to the exclusions regarding consequential damage."

Add the following after the eighth paragraph of Clause 1201 of the Specifications:

"Unless otherwise specified or ordered, the Contractor shall not execute any alterations to existing services. Generally the Engineer will instruct the Contractor to arrange for the relevant service authority owner to move, relocate and reinstate or protect their own services interfering with the works. Where the service authority owner carries out any service alterations or protective measures as instructed, the Contractor shall co-operate with and allow such authority reasonable access and sufficient space and time to execute the required work. Location of services using specialised detection equipment, protection, relocation and/or reinstatement of existing services shall be measured and paid for under this Section 1200 of the Schedule of Quantities. Excavation and backfilling for exposing and locating existing services shall be paid for under Section 2200."

Add the following after the ninth paragraph of Clause 1201of the Specifications:

"Should any work become necessary due to unforeseen circumstances then all work shall be done strictly in accordance with the requirements of the relevant service owner and in terms of the Specifications. This clause shall in no way relieve the Contractor of his responsibilities for existing services. Payment for such work shall be determined according to Subclause 6.4 or 6.5 of the General Conditions of Contract as authorised by the Engineer."

Add the following:

"WAYLEAVES, PERMISSIONS AND PERMITS

The Contractor shall be responsible for obtaining all of the necessary wayleaves, permissions or permits applicable to working near any existing services or other infrastructure on Site, and shall ensure that any wayleaves, permissions or permits obtained by the Employer's Agent prior to the award of the contract are transferred into the

Contractor's name.

The Contractor shall abide by any conditions imposed by such wayleaves, permissions or permits.

The Contractor shall ensure that all wayleaves, permissions and permits are kept on Site and are available for inspection by the relevant service authorities on demand.

The Contractor shall also ensure that any wayleaves in respect of electricity services are renewed timeously every three months.

EXISTING SERVICES

During the period of time allowed for the commencement of work in terms of Clause 5.3.1 of the General Conditions of Contract and before commencing work on site the Contractor shall confer with all authorities and departments concerned regarding all services both overhead and underground affected by the works. At such conferences, which will be convened by the Engineer's Representative, the Contractor shall satisfy them self that he has obtained all the information regarding existing services that he needs to complete the Contract. The Contractor will also be informed which existing services, if any, will be altered in any way and whether it is proposed to lay any new services during the period of the Contract, and a schedule of operations, insofar as the services are concerned, shall be drawn up and agreed upon. No work shall be started until such schedule of operations has been agreed upon.

The Contractor shall carry out the works with the minimum interference to existing services. He shall co-operate with all Authorities and Departments concerned and he shall be solely responsible for carrying out the following operations and checks:

(1) He shall inform all Authorities and Departments in good time before the correct stage of the construction is reached for the laying and/or relaying of any particular services.

(2) He shall set out the lines and levels of kerbs, pipes, culverts and any other necessary features of the Contract in order that Authorities and Departments are able to lay and/or relay services correctly.

It shall be clearly understood that obtaining the necessary wayleaves and any extra work, such as the removal of any portion of the Works already executed either by the Contractor or other Authority or Department and its subsequent re-execution, which is caused by the Contractor's failure to observe and carry out his responsibilities as specified, will be at his own cost.

If the Contractor considers that the progress of the works is being retarded by the failure of any Authority or Department to lay, remove or divert pipes, ducts, services, cables or poles within a reasonable time, he shall immediately notify the Engineer in writing, stating clearly the number of days of delay claimed. The Engineer will then decide whether such a claim is justifiable, and in the event of the claim being accepted he will hand to the Contractor a certificate stating clearly the number of days of delay sanctioned.

The cost of repairing any damage to services, due to miscalculations or negligence on the part of the Contractor or his failure to carry out the duties set out in this Clause, shall be borne by the Contractor.

(a) Protection of overhead and underground services

The Employer has endeavoured to locate all services and sub-surface obstructions likely to be affected by the work, based on available records and surveys and have been shown on the drawings. These will be indicated to the Contractor prior to the commencement of works in the wayleaves obtained. Although every care has been exercised in the presentation of the available data, the Employer cannot and does not vouch for the accuracy or completeness of the information shown. Whenever the Contractor deems it necessary to determine the exact location of an existing service or obstruction, he shall, at his own expense, make any examination that he may consider desirable in advance of the work, and the Employer does not accept any liability for loss, damage or delay to the Contractor as a result of the non-location or inaccurate location of services or obstructions.

Where no underground services are shown on the drawings or scheduled, but the possibility of their presence can be reasonably inferred, the Contractor shall in collaboration with the Engineer, search for such services to establish their positions well in advance of the work. A full report shall then be submitted in good time to the Engineer, to enable the necessary arrangements for the protection, removal or diversion of the services before work is commenced in their vicinity.

In the event of damage to existing services, the Contractor shall take such immediate action as is necessary to prevent further damage or danger to life or property and shall immediately notify the Engineer who will issue instructions as to the necessary repairs or protective measures to be taken. The cost thereof shall be borne by the Contractor irrespective of whether the repairs or protective measures were carried out by him or by or on behalf of the service authority or department concerned.
As soon as an underground service not previously indicated by the service provider or the Engineer is discovered, it shall be deemed to be a known service and the Contractor will be held responsible for any subsequent damage to it. If such service is damaged during the course of its discovery, the Contractor will be reimbursed for the cost of making good such damage, unless it is established by the Engineer that the Contractor did not exercise reasonable diligence and care and that the damage was avoidable.

(b) Existing services

"Existing service" shall include any service which has been temporarily taken out of service to allow for the execution of the works or which has been taken out of service as a result of an event which necessitated the execution of the works.

(c) Condition of existing services

The Contractor acknowledges that he has inspected and examined all known existing services and all existing services subsequently discovered, as contemplated in (a) above and is satisfied that all such services were in an acceptable and serviceable state at the commencement of the works, alternatively, upon discovery thereof as contemplated in (a) above.

In the event of a dispute as to the acceptability and/or serviceability of an existing service at the commencement of the works or upon the discovery of such service, the Contractor shall bear the onus of proving that the service in question was not in an acceptable and/or serviceable state at the commencement of the works.

(d) Maintenance, protection and relocation of existing services

During the course of the works, all existing services including traffic signals, watermains, sewers and stormwater reticulation, electricity transmission and telephone lines, cables, poles and conduits whether in service or not shall be protected, supported and maintained to the satisfaction of the service authority or department concerned and the Engineer. The Contractor shall bear all costs in this regard.

When the Contractor details his programme of work in his Contract Programme, he shall, in consultation with the Engineer, clearly indicate when he will require the relevant service department or authority to start with the disconnection of the services and when the services can be reinstated.

Where a bank of underground ducts, cables, etc are crossed over a distance of less than 1.0m they shall be regarded as a single crossing. Hydrants under pressure, watermain valve covers and manholes shall be kept unobstructed and accessible at all times.

Where the existing stormwater system is affected by the roadworks, drainage pipes and structures will have to be upgraded, adapted or demolished and new drainage pipes and structures constructed.

The covers and frames of service manholes and catchpits will have to be adjusted where they are affected by the roadworks.

(e) Work in close proximity to existing services

The Contractor shall note that no mechanical excavators or vibratory type compactors may be used within three (3) metres of any telecommunications or electrical services. No pegs or stakes shall be driven into the ground in the vicinity of underground services unless their exact positions have been determined.

The Contractor's attention is drawn to the following with regard to work done in the proximity of ESKOM and other electrical services:

MACHINERY AND OCCUPATIONAL SAFETY ACT (Act No 6 of 1983) WITH REGULATIONS
D16 (7) Excavations
"The builder or excavator shall ascertain as far as practicable the location and nature of underground services likely to be affected by the excavation and take such steps as may be necessary to prevent danger to persons."

THE ELECTRICITY ACT (Act No 40 of 1958)
Section 51(3) : Offences and Penalties
"Any person who without legal right (the proof of which shall be upon him) cuts or damages or interferes with any apparatus for generating, transmitting or distributing electricity, shall be guilty of an offence and liable on conviction to a fine not exceeding R1 000,00 or to imprisonment for a period not exceeding twelve months."

The Contractor shall take the above into account in the drawing up of his construction programme and in the calculation of his tendered rates, and shall note that no additional payment or compensation will be allowed for any additional costs or delays incurred as a result of compliance with these regulations, except as measured and paid under the Items listed in the Schedule of Quantities.

The Contractor shall allow all reasonable access to the representatives of any Authority or Department for the purpose of maintaining, laying and/or relaying any services, cables or mains during the period of the Contract.

Permanent alterations to existing services ordered in writing by the Engineer, and for which no separate provision has been made in the Bill of Quantities, will be paid for under dayworks if required."

B1204 PROGRAMME OF WORK

a) General requirements

Add the following as a continuation of the first paragraph:

"In drawing up the programme the Contractor shall make allowance for the following:

i) The majority of the work to be done on this project will be done during the day between sunrise and sunset. Lane closures must be removed after the works, except for permanent closures.

ii) All special non-working days defined in the Contract Data.

iii) The expected delays defined in B1215: Extension of time resulting from inclement weather as a terminal float.

iv) The following embargo hours and days will be applicable for this contract:

1. The contract period will not exceed 8 months Works including all preliminary obligations.
2. Due to heavy traffic expected, at the beginning and end of the Christmas break and the Easter weekend, unobstructed traffic flow must be maintained for the traveling public during these periods.
3. Allowance should be made for the SAFCEC scheduled break and for a day before/after and during the Easter Weekend of 2017 for which no extra time will be granted.
4. All major events, e.g. etc., as instructed by the Engineer shall be considered non-working times.

v) The following restricted working conditions:

1. During the Contractor's annual shutdown period in December and January, the Contractor shall ensure unobstructed traffic flow within the contract limits.
2. Work may only proceed behind barricaded-off working areas, where working areas are subject to specified rules.
3. The public traffic shall be disrupted as little as possible. Closure of lanes over certain time periods will not be allowed.
4. There are weather limitations during which no asphalt work may be possible. Special allowance must be made for other cold days outside this period (refer to table B1215/1)
5. Closures lengths should be limited to the length of road that can be milled and replaced in one day and re-opened to traffic that afternoon.

vi) Meeting the requirements of the Environmental Management Plan (EMPi).

vii) The time needed for preparation and approval of the various mix designs (approximately 6 weeks) specified in the relevant construction sections of the Scope of Works.

viii) Noise emission as a result of construction activity during night-time should be limited as far as possible. The construction programme should be programmed in such a way that loud construction equipment such as jackhammers, saw cutting machines etc are not used between 23:00 – 07:00 unless approved by the Engineer. Additionally, adequate time should be allowed for in the programme for obtaining relevant work permits, noise exemption permits and wayleaves.

ix) Five weeks shall be allowed for in the programme to resolve and obtain approvals as defined in Clause 5.3.1 item (j)."

Insert the following paragraphs:

"c) Additional programme requirements

In addition to the requirements of clauses B1204(a) and B1204(b), and of clause 5.6 of the General Conditions of Contract for Construction Works, the programme of work shall include the following details:

(i) A work breakdown structure that identifies all major activities.
(ii) Scheduled start and end dates for each activity.
(iii) Linkages between activities that clearly identify sequence, floats and critical path.
(iv) Intended working hours and resource allocations (plant and labour).
(v) Monthly cashflow projections.
(vi) Key dates in respect of information required or due delivery."
(vii) The Contractor's payment weekends
(viii) A risk assessment schedule with mitigating plans of issues that could prevent the due completion date being met.

Should the engineer require an electronic version of the programme for review purposes, the Contractor shall supply the programme in a format compatible with the engineers software."

d) Programme revisions

The programme will be reviewed at the monthly site meetings at which the Contractor shall provide sufficient detail that will allow the comparison of completed work per activity against the current programme. The Contractor shall indicate what resources and programme changes he intends to implement in order to remedy any activity that has fallen behind. The engineer may demand from the Contractor a major revision of the programme. Such a revision shall be submitted for comment within 14 days of the demand."

The Contractor shall base his initial / preliminary programme of work submitted with his tender on the Scope of Work as described in the project specification and the schedule of quantities. If an alternative contract period is offered, the Contractor shall submit a separate programme with the alternative tender.

Insert the following paragraphs:

e) Limitations

The Contractor shall take into account the following when drawing up his construction programme:

(1) Working time: This will be a daytime working project with most of the Scope of Work to be carried out during the day. Refer to B1201(a)(i) defining specific working hours:

(2) Construction limitations

Requirements for safety and accommodation of traffic as set out in the Project Specifications shall be strictly enforced. Traffic shall be accommodated on the existing surfaced carriageway and shoulders. No bypasses or temporary deviations shall be constructed. Accommodation of traffic will generally be carried out by closing off a shoulder and/or one lane of traffic at a time and accommodating the traffic on the other lane(s). Details of lane closures during the various stages of work, are indicated in the Specifications and/or shown on the various traffic accommodation drawings included in Volume 4 : Drawings.

(3) Other contracts

In accordance with Clause 4.9 of the general conditions of contract, the Contractor shall note and make do allowance for reasonable access to and for the adjacent operations of these other contractors on the site of the works. The Contractor will be required to liaise with these contractors / Engineer to discuss and ensure that their adjacent operational requirements and activities will interface and are catered for in programming of the work."

B1205 WORKMANSHIP AND QUALITY CONTROL

Replace the third paragraph with the following:

"The Contractor shall determine his own frequencies at which quality or process control tests are to be undertaken. The Engineer will, however, undertake all acceptance control tests for the judgment of workmanship and quality of products."

Add the following at the end of this clause:

"The Engineer shall, for the purpose of acceptance control on products and workmanship, assess test results and measurements in accordance with the provisions of Section 8200 of the standard specifications (quality control scheme 1). Where small quantities of work are involved, a lot shall mean a full day's production for a specific item of work subject to acceptance control testing."

B1206 THE SETTING OUT OF THE WORK AND PROTECTION OF BEACONS

Add the following after the first paragraph:

"It is a specific requirement of this Contract that the Contractor will have to establish his own reference and control beacons for the setting-out and control of the works. The position of the works shall generally be as indicated on the drawings but shall be confirmed on Site by the Engineer. Survey work will not be measured and paid for directly and compensation for any work involved in staking or setting out will be deemed to be covered by the rates tendered and paid for the various items of work included in this contract."

Add the following at the end of the fourth paragraph:

"Road markings, particularly road junction / intersection lines, the divergent/convergent lines of ramp at interchanges and no overtaking barriers are also elements of the road that require proper setting out. The Contractor shall prove to the Engineer that critical reference points have been satisfactorily recorded for later reinstatement before any work commences that will obliterate the existing markings."

Add the following to this clause:

"On award of the project, the Contractor shall establish reference beacons, and/or other reference systems for the adequate control of his work and shall carry out a survey at 10 m intervals consisting of X,Y and Z coordinates as follows:

- Pedestian sidewalk, 1.5 m from edge of surfacing
- Edge of surfacing on the LHS and RHS of the road (either kerb/channel edge and face of kerb or start of gravel shoulder),
- The LHS and RHS yellow lines, or the centre of the L and RH lanes where there is no yellow line,
- The centre line of the road
- Existing line marking shall also be referenced

All survey shall be done in accordance with COLTO: Standard Survey Methods – TMH 11: 2012 and levels (Z) shall not be measured using a GPS device. The Survey Accuracy given in the table below shall apply.

Feature	Horizontal Accuracy	Vertical Fixing Accuracy
Kerbing and edge of asphalt	50 mm	10 mm
Road surface (Seal / Asphalt)	50 mm	10 mm

The survey shall be given to the Engineer within two (2) weeks of award in order to determine new design centreline levels. It shall be the Contractor's responsibility to maintain and protect all marker posts and reference beacons.

Setting out of the final lane markings and signage must be done identically to the existing lanes and signage, unless otherwise instructed and shall be checked and agreed to by the Engineer's Representative in writing before final application.

The Contractor shall be responsible for establishing the necessary beacons and recording the precise signage and road marking detail and positions thereof laterally across the road, especially around curves and it will be the Contractor's responsibility to ensure the accuracy thereof and to derive co-ordinates etc for later setting out purposes."

No separate payment will be made for any setting-out, the providing of permanent beacons and reference pegs, staking, detail surveys, taking cross sections, checking benchmarks, referencing existing road markings or any work described in this clause."

Add the following after the eighth paragraph:

"The Contractor shall reference all road markings to allow for the reinstatement thereof after completion of the sections of road reconstruction, surfaced and/or sealed under this contract. Separate payment will be made under Section 5700 of these specifications for the referencing of the existing road marking features of the road as required."

Add the following paragraph:

"The Contractor shall take care that property beacons, trigonometrically survey beacons or setting-out beacons are not displaced or destroyed without the consent of the engineer. Property beacons and trigonometrically survey beacons that have been displaced or destroyed shall be replaced by a registered land surveyor, who shall certify such replacement.

The cost of replacing all beacons displaced or destroyed during the course of the contract without the consent of the Engineer shall be the Contractor's responsibility and included in the tender rates.

All Municipality Benchmarks encountered on the project are to be reported to Employer's Agent immediately upon discovery."

B1207 NOTICES, SIGNS AND ADVERTISEMENTS

Delete the final paragraph and replace with the following:

All signboards erected in accordance with the drawings or as approved advertisements for the Contractors establishment, shall be removed at the same time as the Contractors disestablishment. Payment under sub-item B13.01 for the final instalment of 15% of the tendered lump sum shall not be made unless all the advertisements, notices and temporary signs have been removed.

B1209 PAYMENT

(b) Rates to be inclusive

Add the following:

"No value added tax shall be included in the Contractor's tendered rates or amounts. Payment of value added tax (VAT) shall be made under a separate item in the Summary of Schedule(s) in C2.2 Bill of Quantities in C2 Pricing Data."

(c) The meanings of certain phrases in payment clauses

(i) Procuring and furnishing (material)

Add the following:

"Payment for procuring and furnishing material from commercial sources shall include for all transport costs, irrespective of distance hauled."

Add the following new subclauses:
"

(g) Work in confined areas

Except where provided for in the Specification **and** the Bill / Schedule of Quantities in the Pricing Data no extra payment shall be made nor shall any claim for additional payment be considered for construction in confined areas. The omission of standard pay items from the Bill / Schedule of Quantities shall be taken to be deliberate and any additional costs incurred shall be included in the bulk rate.

(h) Rates to remain unchanged when Scope of Work changes

Dependent on the rates and prices offered in the Bill / Schedule of Quantities in the Pricing Data, the Employer intends to increase or reduce the Scope of Work to match the budget allowed for this project. To this end the Contractor has been provided the opportunity to price separately for unit rates of work and the establishment of major plant. The value of such increase or reduction in the Scope of Works shall not give cause for the Contractor to vary the offered rates and prices, which shall remain final and binding for the duration of the contract, provided that:

(i) Notification of the change to the Scope of Work is given in writing within 28 days of the tender closing date.
(ii) The value of the increase or reduction in the Scope of Work does not alter the tendered sum by more than 15%."

(i) Trade names

Where materials are specified under trade names, tenders must be based on these materials. Equivalent materials may be submitted as alternative tender offers in the tender and the Engineer may, after receipt of tenders, approve the use of equivalent materials.

(j) Payment Certificates

With reference to Clause 6.10.1 of the General Conditions of Contract, the Contractor shall, at his own expense, submit to the Engineer three sets of A4-sized paper copies of the monthly statement for payment."

B1210 CERTIFICATE OF PRACTICAL COMPLETION OF THE WORKS

Add the following to subclause (e) before the semicolon:

"(including road studs)"

Add the following paragraphs after item (h):

"Notwithstanding that there might be natural or programmed sections of the works that will result in them being completed in their entirety before other sections, no consideration shall be given to the issuing of practical completion certificates for portions of the works. The use of any completed roadway or portions of the work, whether for unhindered use by the public or for accommodation of traffic while other portions are being constructed, shall not constitute use or occupation by the Employer.

In addition to the listed specified items of work and regardless of the degree of beneficial occupation by the Employer, the Works shall be considered for practical completion only if the following criteria also have been met:

(i) The estimated cost to complete the outstanding work is less than 2% of the tendered value of work plus the cost of any variation or extra work orders, but excluding CPA and VAT.
(ii) The written list of outstanding items of work can be completed within 28 days of the list having been accepted in writing by the Contractor.
(iii) Any information in the Contractor's possession, which is required by the engineer and has been requested in writing, has been supplied.
(iv) The Regional Manager of the Department of Mineral and Energy Affairs has issued written confirmation to the Contractor that they are satisfied with the final shaping to all quarries, borrow pits, stockpile areas, and spoil sites used or intended to be used under this contract."

B1211 TRAFFIC OVER COMPLETED PAVEMENT LAYERS

Add the following:

"It is a specific requirement of this contract that traffic will have to be accommodated on completed pavement layers on certain road sections during peak hours and overnight. The final decision regarding the timing of opening of the completed pavement layers to traffic shall rest with the Engineer. Repair work required to the completed pavement layers shall be included in the rates for accommodation of traffic and no additional payment will be made for work required to repair damage.

Completed asphalt surfacing shall not be opened to traffic until the asphalt has sufficiently cooled. The Contractor shall not allow construction equipment or public traffic, which is likely to cause damage, over the completed asphalt surfacing."

B1214 CONTRACTOR'S ACTIVITIES IN RESPECT OF PROPERTY OUTSIDE THE ROAD RESERVE AND OF SERVICES MOVED, DAMAGED OR ALTERED

Under subclause (e) replace the opening paragraph with:

"Should the Contractor use land not provided by the Employer for the purpose of his own establishment, engineer's offices and laboratory, or storing of equipment or materials required for construction or disposal, it shall be subject to the following:"

and add the following subclauses under subclause (e):

"(vi) That lease agreements are concluded with the owner or owners of such land for the full period that such areas are required. The leases shall provide for possible extensions to match the duration of the contract. The lease agreements shall also provide for the contract being terminated by Contractor's default or liquidation and the resulting possibility for them to be taken over by a succeeding Contractor.

(vii) That copies of lease agreements shall be submitted to the engineer prior to signature by the signing parties, and copies lodged with the engineer after signing. Notwithstanding the engineer's approval of the conditions of a lease the Contractor shall be solely responsible for adhesion to the terms of the agreements.

(viii) Adherence to the principles of the environmental management plan and legal obligations.

B1215 EXTENSION OF TIME RESULTING FROM ABNORMAL RAINFALL

Delete the entire clause and replace with the following:

"For the purposes of calculating an extension of time due to climatic conditions in terms of Clause 5.12.2 as amended of the General Conditions of Contract, the number of days in excess of the number of working days anticipated to be lost due to climatic conditions shown in Table B1215/1 shall be taken into account:

Table B1215/1 Anticipated days lost due to normal climatic conditions

Month	"n" Working Days	Month	"n" Working Days
January	8	July	2
February	6	August	2
March	6	September	4
April	4	October	6
May	2	November	7
June	2	December	8

The Engineer will certify a day lost due to climatic conditions only if:

- no work on the critical path according to the latest approved programme for completion of the works could be carried out during that specific working day or if
- only 30% or less of the work force and plant planned for that specific day, could work.

The extension of time as a result of climatic conditions will be calculated monthly as being equal to the absolute value of number of days certified by the Engineer as lost due to climatic conditions, less the number of days in Table B1215/1.

The total extension for the contract will be the sum of the monthly extensions. Extension of time for six-day working weeks and parts of a month shall be calculated pro rata.

The Contractor shall submit to the Engineer claims for all time lost due to inclement weather within 1 working day of the claim day. A record of inclement weather shall be kept by the Contractor and recorded at site meetings on a regular basis. The onus is on the Contractor to prove these claims."

B1216 INFORMATION FURNISHED BY THE EMPLOYER

Add the following after the second paragraph:

"Drawings and quantities regarding the distribution and extent of repair work items were compiled and calculated to the best of the Engineer's knowledge and available information at the time of the design and could be subject to significant variations at the construction stage. Such variations shall, however, not form grounds for a claim by the Contractor in terms of Clause 6.3: Variations of the General Conditions of Contract."

B1217 PROTECTION OF THE WORKS AND REQUIREMENTS TO BE MET BEFORE CONSTRUCTION OF NEW WORK ON TOP OF COMPLETED WORK IS COMMENCED

Add the following:

"(h) Prior to the start of any excavation in the existing pavements on any part of the works, the Contractor shall submit to the Engineer for approval a method statement for the execution of that part of the work. The Contractor is responsible for the protection of the underlying pavement layers and the drying out and/or keeping dry of such excavations. The Contractor's program shall make provision for the speedy backfilling of the excavations and the drainage thereof if inundation cannot be prevented.

The Contractor shall at his own cost be responsible for the repair of pavement layers, which have been damaged due to his own works or his neglect to submit his planning to the Engineer for approval or to adhere to approved precautionary measures.

(i) Concrete elements adjoining the road, which is designated for resurfacing, shall be covered with protective material prior to any spraying operations to prevent the concrete from being stained with bituminous binder. The protection of concrete elements shall be to the Engineer's satisfaction and no additional payment will be applicable for taking the specified protection measures.

(j) Manholes and catchpits are to be adequately closed and protected immediately before milling works commence, and opened and cleaned if necessary immediately after asphalt works are complete."

B1219 WATER

Add the following:

"The Contractor shall make the necessary arrangements and connections for the provision of water required by him for the execution of the works."

B1224 THE HANDING-OVER OF THE ROAD RESERVE

Add the following:

Upon being given access to the site the Contractor shall immediately assume responsibility for the road reserve within the limits of this contract as set out in the specifications.

Prior to the commencement of work the Contractor and the Engineer shall together carry out a joint inspection of the road section. During such an inspection, notes shall be made of all damaged fences, guardrails, signs and any other notable problems or features that exist at the time of gaining access or hand-over. The following matters should be agreed at the time of handing-over:

(1) The limits, lengths, widths and areas of construction.
(2) The location of kilometre markers and reference beacons
(3) The scope of remedial / repair or preparatory work measures (patching, crack sealing, etc.) to be executed by the Contractor
(4) The location of stockpile areas and the responsibilities of the Contractor with regard to the road reserve area and the stockpile sites (fencing, re-establishment, height of stockpile, etc.).
(5) The method of accommodation of public traffic with regard to safety, sight distances, interference with existing road signs and road markings both within the work area and providing advance warning before the work area.
(6) The method of construction and supervisory control measures
(7) The protection of existing bridge joints, concrete kerbs/channels, rumble strips and road studs where necessary.

B1229 SANS CEMENT SPECIFICATIONS

Add the following to this clause:

"All cement used during construction shall comply with SANS 50197-1 specifications for cement. Where reference is made in this specification or the standard specifications to the cement specifications, e.g. SABS 471: Portland cement and rapid hardening Portland cement, it shall be replaced with the new specification:

SANS 50197-1 "Cement compositions, specifications and conformity criteria Part 1: Common cements".

On this contract CEM II B-L 32.5 MPa or CEM II B -M 32.5 MPa shall be used. All cement products on Site shall conform to the specification and shall bear the inspection seal or brand mark of the SABS (South African Bureau of Standards)."

Add the following new clauses:

B1230 SANS BITUMEN SPECIFICATIONS

Where reference is made in this specification or the standard specifications to the SABS / SANS bitumen specifications, the following new SANS specification shall apply:

SANS 4001-BT1:2014 - Penetration Grade Bitumen's
SANS 4001-BT2:2012 - Cutback Bitumen
SANS 4001-BT3:2014 - Anionic Bitumen Road Emulsion
SANS 4001-BT4:2014 - Cationic Bitumen Road Emulsion
SANS 4001-BT5:2014 - Inverted Bitumen Emulsion
Technical Guideline 1 (TG1) – The use of Modified Bituminous Binders in Road Construction – 3rd Edition, November 2020

B1231 MATERIALS

(a) SABS Compliance

All products used on this contract shall, where a SANS specification exists for such product, conform to the specification and shall bear the inspection seal or brand mark of the SABS (South African Bureau of Standards). Materials that are SABS “compliant” but have not been approved with the SABS brand mark shall not be accepted.”

Where proprietary products have been specified, similar products may be used subject to the prior written approval of the Engineer.

Unless otherwise specified, all proprietary materials shall be used and placed in strict accordance with the relevant manufacturer's current published instructions.

Unless anything to the contrary is specified, all manufactured articles or materials supplied by the Contractor for the permanent works shall be unused.

Earth, stone, gravel, sand, and all other materials excavated or present on the Site or in borrow areas provided by the Employer shall not become the property of the Contractor, but will be at his disposal only in so far as they are approved for use on the Contract. Existing structures on the Site shall remain the property of the Employer and except as and to the extent required elsewhere in the Contract, shall not be interfered with by the Contractor in any way.

Existing structures on the site shall remain the property of the Employer and except as and to the extent required elsewhere in the contract, shall not be interfered with by the Contractor in any way.

No materials to be included in the works shall be damaged in any way and, should they be damaged on delivery or by the Contractor during handling, transportation, storage, installation or testing they shall be replaced by the Contractor at his own expense.

All places where materials are being manufactured or obtained for use in the Works, and all the processes in their entirety connected therewith shall be open to inspection by the Engineer (or other persons authorised by the Engineer) at all reasonable times, and the Engineer shall be at liberty to suspend any portion of work which is not being executed in conformity with these specifications.

The Contractor shall satisfy himself that any quarry selected for use provides the necessary mined material in accordance with the specification.

(a) Ordering of Materials

Immediately upon his Tender being accepted, the Contractor shall order materials which are in short supply or for which the delivery period may be long.

The quantities set out in the Schedule of Quantities have been determined from calculations based on data available at the time and should therefore be considered to be only approximate quantities. The Contractor shall therefore, before ordering materials of any kind, check with the Engineer the quantities required. No liability or responsibility whatsoever shall attach to the Employer for materials ordered by the Contractor except if they have been ordered in accordance with written confirmation issued by the Engineer.

B1232 SAFETY

The Contractor shall at all times observe adequate safety precautions on Site to ensure the safety of his own staff as well as that of the public and other persons engaged in or about the Works. In this respect he shall comply with the provisions of the Health and Safety specifications (Part G of the Works Specifications) and observe all laws, ordinances and regulations pertaining to his work.

In terms of Clause 4.5 of the General Conditions of Contract, the Contractor shall enter into an agreement (refer to C1.4 of Volume 3) to complete the work required for the construction of the works in accordance with the provisions of all pertinent legislation and in particular with the provisions of the Occupational Health and Safety Act, (Act 85 of 1993) and the regulations promulgated thereunder.

Where adequate safety precautions are not being observed, the Engineer may order the Contractor to comply with minimum safety requirements at the latter's expense. Compliance with such an order will not absolve the Contractor from any of his responsibilities and obligations under the Contract.

B1233 MIX DESIGNS

6 weeks before commencing with certain construction activities, the Contractor shall, except where specified otherwise in the relevant construction sections in the Scope of Works, apply the following procedures with regards to mix designs:

- Taking and submitting samples of the relevant materials.
- Undertake the required mix design(s) or allow the engineer to undertake them.
- Produce, where required, laboratory, production/plant and/or trial mix(es).
- Undertake the required adjustments to the mix design(s) and reproduce required laboratory, production/plant and/or trial mix(es).
- Complete trial section(s) where required.
- Await the engineer’s approval of the mix design(s) and trial section(s).

B1234 COMMUNITY LIAISON OFFICER (CLO)

Refer to *Section C1.8 Contract of Temporary Employment as Community Liaison Officer*.

B1235 TRAINING

All task-based workers, as well as trainee SMMEs, that participate in this project shall receive a level of training for which they receive accreditation. Suitable training will be given by an accredited nominated subcontractor prior to the commencement of any construction. For this purpose, Tenderers shall allow a lead time of 2 weeks in their programme for initial training as well as consultations and negotiation with the local community representatives.

In addition, the necessary in-task training to achieve the required standard of workmanship must be provided on an ongoing basis by the Contractor during the Contract.

B1236 MEASUREMENT AND PAYMENT

Item			Unit
B12.01	**The Contractor's obligations in respect of local and other labourers**		
	(a)	Provision of Medical Examination for Local Labourers	PC. Sum
	(b)	Contractor's charge to allow for handling costs and profit in respect of subitem 12.01(a)	%

The provisional sum under pay item B12.01(a) shall be paid in accordance with the provision of sub-clause 6.6 of the General Conditions of Contract. The provisional sum shall include all other incidentals required and approved by the Engineer.

The tendered percentage under B12.01(b) is a percentage of the actual amount spent under subitem B12.01(a) which shall include full compensation for the handling costs of the Contractor, and the profit in connection with the provision of transportation and medical examination for local labourers as ordered by the Engineer.

Item			Unit
B12.02	**Remuneration of the Community Liaison Officer and members of the Steering Committee**		
	(a)	Community Liaison Officer (CLO)	PC. Sum
	(b)	Contractor's charge to allow for handling costs and profit in respect of subitem 12.02(a)	%

The provisional sum allowed for in item B12.02(a) shall cover the cost of temporary employment of the community liaison officer, according to Section C1.8 – Contract of Temporary Employment as Community Liaison Officer with the conditions and remuneration prescribed therein.

The rates tendered under sub-item B12.02(b) shall be deemed to cover the Contractor's handling cost, profit, record keeping, reporting and all other costs in connection with the employment of the community liaison officer.

Item			Unit
B12.04	**Training**		
	(a)	Technical skills accredited and approved training courses for selected Local and other Labourers including wages during training	Prov. Sum
	(b)	Remuneration of workers undergoing training and other Labourers including wages during training	Prov. Sum

(c)	Contractor's charge to allow for handling costs and profit in respect of subitem B12.04(a) & (b).	%
(d)	Remuneration and all associated costs for the employment of One FET or University graudate from the local community as approved by the Engineer	PC Sum
(e)	Contractor's charge to allow for handling costs and profit in respect of subitem 12.04(d)	%

Expenditure under B12.04(a) & (b) shall be made in accordance with the Section 6.6 of the General Conditions of Contract for the provision of training by an accredited service provider approved by the Engineer.

The tendered percentage under B12.04 (c) is the percentage of the actual amount spent under subitem B12.04(a) & (b) which shall include full compensation for the handling costs of the Contractor, and the profit in connection with the provision of the training by approved service provider.

The tendered percentage under B12.04 (f) is the percentage of the actual amount spent under subitem B12.04(e) which shall include full compensation for the handling costs of the Contractor, and the profit in connection with the provision of the training by an accredited service provider approved by the Engineer.

Expenditure under B12.04(d) shall be made in accordance with the Section 6.6 of the General Conditions of Contract for the provision of practical training for FET or university graduate.

The tendered percentage under B12.04 (e) is the percentage of the actual amount spent under subitem B12.04(d) which shall include full compensation for the handling costs of the Contractor, and the profit in connection with the provision of practical training for FET or university graduate.

Item		**Unit**
B12.06	**Hand excavation for the exposing of, or searching of services:**	
(a)	0 m up to 2m	
	(i) Soft Material	m^3
	(ii) Hard Material	m^3
(b)	Exceeding 2 m up to 4 m	
	(i) Soft Material	m^3
	(ii) Hard Material	m^3

The unit of measurement shall be the cubic metre of material excavated by hand as shown in the project drawings and approved by the Engineer.

The tendered rate shall include full compensation for all the work necessary for excavating and removing material as well as additional cost necessary to transport, stockpile and dispose of these materials.

Item		Unit
B12.07	**Supply and erection of contract sign boards**	No.

The unit of measurement shall be the number of completed contract sign board as per project drawings.

The tendered rate shall include full compensation for procuring and furnishing all the materials, and for manufacturing and supplying the completed road sign board, including amongst others the supporting framework, reinforcement, cross bracing, struts, fixing brackets, angle irons, channel profiles, galvanizing (if specified), painting, retro-reflective or semi-matt black lettering, symbols. numbers, arrows, emblems and borders, for attaching the road sign board to a road sign support structure, or to an overhead road sign structure, or to an overbridge, and for all materials, equipment, labour, supervision, nuts, bolts, transport, handling, etc necessary for the manufacture, completion, delivery and installation of the road sign board complete as specified.

Item		Unit
B12.08	**Protection, removal, realignment and replacement of services:**	
(a)	Provisional sum for relocation or protection of sewer	Prov. Sum
(b)	Provisional sum for protection relocation of Telkom services and fibre optics	Prov. Sum
(c)	Provisional sum for protection of existing water mains	Prov. Sum
(d)	Provisional sum for protection or relocation of streetlights as instructed by the Engineer	Prov. Sum
(e)	Provisional sum for detection of underground services as instructed by the Engineer	Prov. Sum
(f)	Provisional sum for high pressure jetting of existing stormwater pipes as instructed by the Engineer	Prov. Sum
(g)	Contractor's handling costs and other charges on subitems B12.08(a) to (g)	%

Expenditure under B12.08(a) to (g) shall be made in accordance with the Section 6.6 of the General Conditions of Contract for the detection, protection, removal, realignment and replacement of services.

The tendered percentage under B12.08(g) is the percentage of the actual amount spent under subitem B12.08(a) to (f) which shall include full compensation for the handling costs of the Contractor, and the profit in connection with the detection, protection, removal, realignment and replacement of services."

Item		Unit
B12.10	**Provision of EPWP branding and overalls:**	

(a)	E/O for the provision of ORANGE overalls for EPWP labour	Prov. Sum
(b)	E/O for the provision of EPWP branding on overalls for EPWP labour	Prov. Sum
(c)	Contractor's charge to allow for handling costs and profit in respect of subitem 12.02(a) and (b)	%

The provisional sum under pay item B12.10(a) and (b) shall be paid in accordance with the provision of sub-clause 6.6 of the General Conditions of Contract. The provisional sum shall include all other incidentals required and approved by the Engineer.

The tendered percentage under B12.10(c) is the percentage of the actual amount spent under subitem B12.10(a) &(b) which shall include full compensation for the handling costs of the Contractor, and the profit in connection with the provision and branding of EPWP Overalls.

SECTION B1300: CONTRACTOR'S ESTABLISHMENT ON SITE

B1301 GENERAL REQUIREMENTS

(a) Camps, construction plant and testing facilities

Add the following after the first paragraph of subclause 1302(a) of the Specifications:

"No specific land or existing buildings have been made available on Site by the Employer for the establishment of the Contractor's camp site.

The Contractor shall make his own arrangements concerning establishment of the camp site, supply of water, electrical power and all other services. No direct payment will be made for the provision of water, electrical and other services and the cost thereof shall be deemed to be included in the rates and amounts tendered for the various items of work for which these services are required."

(c) Legal and contractual requirements and responsibilities to the public

Add the following as a second paragraph

"There has been recent legislation promulgated by Government that improve mutual obligations on the Employer and Contractor in the performance of their duties to society and to the built and natural environment. To assist the Contractor in understanding and assessing his obligations, and thus to make allowances for the cost of compliance with this legislation, the following additional specifications are included in the Project Specifications.

C3.4 Construction of the Scope of Works contains:

(i) Environmental Specifications
Environmental Management contains the Environmental Management Plan for this project. Its provisions regulate the Contractor's construction methods to ensure responsible conduct and treatment of the environment relevant to the project. No separate payment mechanism has been made available for the Contractor to allow for his compliance with relevant environmental legislation. Separate Pay Items are included in these provisions. Non-compliance with these provisions may lead to the imposition of penalties.

Its provisions regulate the contractor's construction methods to ensure responsible conduct and treatment of the environment relevant to the project. Payment subitem 13.01(e) makes allowance for the contractor to price for environmental compliance duties as well as the duties of the Designated/dedicated Environmental Officer (DEO) as prescribed in this section.

(ii) Health and Safety Specifications
Health and Safety Requirements which contains the specification that regulate the Contractor's construction methods so far as to ensure health and safety of his employees and of the public. Separate new pay item(s) are included in these provisions to allow the Contractor to make separate provision for the cost of health and safety measures during the construction process."

Add the following:

The Contractor must comply with the latest versions of the COVID-19 Occupational Health and Safety measures in workplaces, detailed in the Government Gazette No. 43257 dated 29 April 2020 and SAFCEC guideline: Protection of workforce during COVID-19."

The following new subitems shall be added after subclause (c):

"(d) Housing

The Contractor shall not erect any housing or other accommodation facilities on the site of the works and shall make all the necessary arrangements for accommodation of his personnel and site staff off the site of the works.

(e) Services

The Contractor shall at his own expense, make the necessary connections to any utility services required by him for the execution of the works.

The Contractor shall note that there are no spare telephone lines available from the Employer's facilities on Site and no cell phone signal is available on the site.

(f) Sanitation

The Contractor shall provide at each work section at least one portable chemical latrine for use by personnel on Site. No separate payment will be made for any costs incurred in this regard and the Contractor shall allow for any costs in his tendered rates for establishment.

(g) Environmental protection

Construction will take place within the existing road reserve and every precaution must be taken to protect the established vegetation and roadside facilities. It is therefore essential that the Engineer be continually consulted throughout the contract period to ensure that environmental considerations are satisfied.

Failure to show adequate consideration to the environmental aspects of this contract will be sufficient for the Engineer to have the Contractor's representative or any other Contractor's employee(s) removed from the site in terms of Clause 24 of the General Conditions of Contract.

The following conditions have been imposed and shall be strictly complied with:

(a) Personnel and plant shall not enter property beyond the road reserve boundary irrespective of whether the boundaries are fenced off or not.
(b) The Contractor shall, to the satisfaction of the Engineer, take every necessary precaution to prevent the contamination of any watercourses.
(c) The Contractor shall plan his activities so that materials, in so far as is possible, can be transported direct to and placed at the point where they are to be used. However, where utilising materials in this manner is impractical, it shall be temporarily stockpiled for later loading and transportation to where it will be used.
(d) Stockpiling areas shall be indicated to and approved by the Engineer. Before any stockpiling of material may be done, the site shall be cleaned, and all loose stones or any plant or other material which may cause pollution shall be removed. After the stockpiled material has been removed, the site shall be reinstated as closely as possible to its original condition.

(e) The Contractor shall be responsible for the establishment of a refuse control system for the collection and removal of refuse from the campsite and working areas.

(f) The Contractor shall ensure that waste and surplus food, food packaging plastic and organic waste are not deposited by his employees anywhere on the site except in refuse bins for removal. If his employees are to eat elsewhere on Site than in the campsite, the Contractor shall designate restricted places for eating in his working areas, shall provide adequate refuse containers in all these places and shall remove the refuse and clean up any remaining food containers immediately after mealtimes.

(g) The Contractor has no right to the trees and shrubs on the site.

(h) No bituminous material or waste material shall be dumped within the road reserve, even if only as a temporary measure. Provision shall be made to remove such excess material directly off the site to spoil areas to be provided by the Contractor.

(h) Security

The Contractor shall take every precaution to ensure adequate safety and security on the Site of the Works and to protect the Works from theft and vandalism. The Contract shall be responsible for the safety and security of his personnel, strict control of access, materials on Site and the Works in general at all times. The Contract shall therefore acquaint himself with the current situation in the area with regard to safety and security (liaising with the local police as necessary) and shall provide all security measures (including the employment of accredited security services), as deemed necessary to comply with the requirements under this clause on the Contract.

No additional pay item is included for the provision of adequate security measures such as watching, guarding and any additional security services and the Contractor shall allow for all costs in connection with the provision of adequate security in his tendered rates for establishment on Site."

B1303 PAYMENT

Item		**Unit**
B13.01	**The Contractor's general obligations:**	
Add the following new subitem:		
(d)	Health and Safety Obligations (Incl. COVID 19)	Month
(e)	Environmental obligation	Month
(f)	Security on site	Month

Payment of the rate per month for items B13/E1000 and B13/H1000 shall include full compensation for all the Contractor's obligations relevant to health and safety legislation, environmental compliance and security on site.

The provisional sum under pay item B13/H1100 shall be paid in accordance with the full compliances of all Covid-19 relevant requirements.

A Contractor who tenders zero for these pay items shall not be relieved of his statutory obligations. A nil rate offered shall be deemed not as an omission but as deliberate notice that costs have been included in the tendered rates for individual items of work or in the other

preliminary and general pay items.

All pay items for which the unit of measurement is "month" are deemed to be based on 23 working days per month and shall become applicable only for use in calculations of approved extensions of time in terms of the Conditions of Contract.

The unit of measurement for pay items B13.01(d) shall be month. The tendered rate shall include full compensation for all administrative costs and incidentals in respect of compliance with and enforcement of these Health and Safety specifications inclusive of the COVID-19 Occupational Health and Safety measures in workplaces, detailed in the Government Gazette No. 43257 dated 29 April 2020 and SAFCEC guideline: Protection of workforce during COVID-19.", which shall include for the compilation, presentation, implementation and maintenance of the site Health and Safety plan as contemplated in regulation 5 of the Construction Regulations.

Note:
The tendered rate is only for the administration of the Contractor's OHS obligations inclusive of COVID 19 requirements. The tendered rate in not compensation for the cost of safety equipment or training. the cost of equipment, training, etc shall be included in the Contractor's bidded rates for other items of the works

Amend the 10th paragraph (paragraph (3)) as follows:

*After the word "*section" *remove the fullstop and add the following:*

", including completing and providing the necessary as-built materials forms and any as-built information required by the Engineer."

*Delete the 17th paragraph commencing "*The tendered rate per month for subitem 13.01(c) *...." and replace with:*

"The tendered rate per month for subitem 13.01(c) (i) and (ii) represents full compensation for that part of the Contractor's general obligations which are mainly a function of construction time.

The tendered sum for (i) will be paid monthly, pro-rata for parts of a month, from the Commencement Date until all requirements of Clause 5.3.1 have been achieved.

The tendered sum for (ii) will be paid monthly, pro rata for parts of a month, from the Commencement Date until the end of the period for completion of the works, plus any extension thereof as provided in clause 5.12 of the General Conditions of Contract, provided that –"

Add the following new sub items between the last paragraph and the second last paragraph"

Should any extension of time claim be approved prior to the successful achievement of all the conditions of Clause 5.3.1, then any time related cost compensation shall be based on the rates as supplied under payment item B13.01(c)(i).

Should any extension of time claim be approved after the successful achievement of all the conditions of Clause 5.3.1 and the actual commencement of the construction works, then any time related cost compensation shall be based on the rates as supplied under payment item B13.01(c)(ii)"

SECTION B1400: HOUSING, OFFICES AND LABORATORIES FOR THE ENGINEER'S SITE PERSONNEL

B1402 Offices and Laboratories

b) Offices

Amend sub-clause (xii) to read as follows:

"(xii) A complete telephone service capable of delivering electronic and facsimile data, together with ..."

Amend subsubclause (xv) of this subclause to read:

"(xv) Each office, the laboratory and conference room shall be provided with:
1) A notice board, size 2 m^2 made from 12 mm softboard with a timber border.
2) A whiteboard, size 2 m^2. This shall be fastened securely to the wall.

Add the following subsubclause to this subclause:

"(xviii) The Contractor shall supply an approved plastic type rain gauge that shall be securely mounted to a pole in a position selected by the Engineer."

Amend sub-clause (xvii) to read as follows:

"(xvii) A combination colour printer/copier/scanner/facsimile machine for A3 and A4 size documents."

Add the following sub-clauses:

"(xviii) Plan holders which shall be able to accommodate 30 AO – sized drawings hanging vertically and of a robust construction to withstand continuous use over the duration of the contract.

(xix) An electric refrigerator of 93l Capacity.

(xx) Floodlights which are to be controlled by a photocell for security purposes at the offices and laboratory.

c) Laboratories

In the second paragraph, second line substitute "drawings" *with* "figures included in the project document"

d) Car Ports

Add the following to this subclause:

"Each car port shall have a headroom of not less 2,5 m."

e) Areas around offices

Add the following to this subclause:

"The offices and the laboratory shall be illuminated at night by security lighting consisting of lamps installed 8 m above ground level on suitable poles to provide illumination not less than 20-lux measured at ground level.

No separate payment will be made for the lighting and the cost thereof shall be deemed to be included in the payment items for the provision of offices and laboratories."

g) Ablution Units

Add the following to this subclause:

"The laboratory ablution unit shall have a minimum floor area of 10 m^2 and shall contain two separate latrines and a separate shower. The office ablution unit shall have a minimum floor area of 2,5 m2 and consist of a latrine with separate urinal and 2 wash basins."

h) Communication System

Add the following new subclauses to this clause:

"(j) Cell phone

The Contractor shall supply the Engineer's Representative with three cell phones(iphone 13) for use on site for the duration of construction. The appropriate battery chargers shall be supplied. The Contractor shall insure and maintain the phones in good working order at all times."

B1403 HOUSING

b) Outbuildings

Replace the first paragraph of this subclause with the following:

"A lock-up garage of at least 20 m2 floor area shall be provided with each house."

b) Rented Accommodation

Replace the full stop at the end of the first sentence of subsubclause (ii) of this subclause with a comma and add "and for all services connected with such accommodation.".

B1404 SERVICES

b) Water electricity and gas

Add the following to the end of the third paragraph:

"The power supply shall be regulated by a suitable voltage regulator in order to maintain a constant current and voltage level at all times to prevent damage to the office and laboratory equipment and related machinery during power surges. In the event of damage to the office and laboratory equipment and related machinery because of a faulty voltage regulator, the

contractor shall be liable for payment of all repair or replacement costs of such damaged items."

Add the following to the end of the fourth paragraph:

"An on-site motor-alternator shall supply electricity when power from a recognized power-supply authority is not available."

B1405 GENERAL

Add the following to paragraph (e):

"In addition, the offices and laboratories shall be supplied with approved burglar proofing and the whole site shall be guarded full time during the day and night, as well as over weekends and holidays. The site shall also be fenced with a 2,4m high security fence with a razor-cut wire being used as strands or with a brick wall. The cost of this protection shall be included in item B13.01."

Add the following to paragraph (f):

"The offices and any living accommodation must be separated by at least 200m."

B1406 MEASUREMENT AND PAYMENT

Item			Unit
B14.03	**Office and laboratory fittings, installations, and equipment:**		
	(a) Items measured by number:		
	Add the following subitems:		
	(i)	220/250 Volt Power Points	Number
	(ii)	Double 80 watt fluorescent-light fittings complete with ballast and tubes	Number
	(iii)	Hand wash basins complete with taps and drains	Number
	(iv)	Fire extinguishers, 9,0 kg all purpose dry powder type, complete mounted on wall with brackets	Number
	(v)	Air-conditioning units with 2.2kw minimum capacity mounted on wall with brackets	Number
	(vi)	Curing chamber for UCS specimens, complete with water connection, including the provision of brick partitions, plaster, paint and shelving, all complete according to the drawings	Number
	(vii)	General-purpose steel cupboards with shelves	Number
	(viii)	Steel filing cabinets with drawers	Number
	(ix)	Refrigerators(Capacity: 93l)	Number

	(x)	Microwave(Capacity 20l)	Number
	(xi)	Supply of Computer and Printer (Laptop i7, Including MSOffice and MS Projects	Number
	(xii)	Cellphones for the duration of the contract (iphone 13)	Number
	(xiii)	Flood Lights complete with poles and 500 Watt min globes	Number
	(xiv)	Projector (Full HD 1080P) and Screen (Incl Tripod)	Number
	(xv)	Kettle (1.75l)	Number
	(xvi)	Refreshments (Tea, Coffee and Milk)	Monthly
	(xvii)	Plan holder	Number
	(xviii)	Rain Gauge	Number

Item			**Unit**
B14.04	**Office and laboratory fittings, installations, and equipment:**		
	(b)	Prime-cost items and items paid for in a lump sum:	
		Add the following subitems:	
	(i)	The provision of telephone service, including the cost of calls in connection with contract administration and telephone rental and internet connection	Prime Cost Sum
	(ii)	Handling costs and profit in respect off sub-item B14.04(b)(i) above	%

Payment of B14.04(b)(i) shall include for the cost of all cellular telephone calls in connection with contract administration, as well as pro rata fixed costs.

The tendered percentage for pay item B14.04(b)(i) shall be a percentage of the amount actually full compensation for the profit and handling costs incurred in managing provision of the cellular phones and monthly billings."

SECTION B1500: ACCOMMODATION OF TRAFFIC

B1501 SCOPE

Add the following:

"It is a condition of this contract that traffic is accommodated in accordance with the provisions of the latest edition of the South African Road Traffic Signs Manual (SARTSM). The latest version for use in the accommodation of traffic is Volume 2, Chapter 13 of the June 1999 edition or its successor. Copies of this publication are available from the South African National Roads Agency Limited, P.O. Box 415, Pretoria, 0001.

This section also covers the provision of additional information signs for motorists and the release of any notices to the media and public. The Engineer will order the Contractor to release approved notices to the media and public all as per the document."

B1502 GENERAL REQUIREMENTS

(a) Safety

Add the following:

"The Contractor shall ensure that all his personnel, excluding those who are permanently office bound, are equipped with reflective safety jackets and that these are worn at all times when working on or in proximity of the travelled way. The safety jackets shall be of an approved Level 2 type, bright/fluorescent orange, red-orange or yellow in colour with retro-reflective strips as indicated in Chapter 13 of Volume 2 of the South African Road Traffic Signs Manual (SARTSM), Figure 13.30 (Detail 13.30.2). When work is carried out between the hours of sunset and sunrise, the Level 2 safety jackets shall be replaced by Level 3 jackets.

Any person found not wearing a reflective safety jacket under these circumstances shall be removed from the site until such time as he/she is in possession of and wearing a reflective jacket. Reflective safety jackets shall be kept in good condition and any jackets that are, in the opinion of the Engineer, ineffective shall be immediately replaced by the Contractor.

The Contractor shall be responsible for maintaining the existing road surface both within the works area and the advance warning and termination areas in a safe and trafficable condition for the duration of the contract."

(i) Traffic safety officer

Add the following after the second paragraph:

"The Contractor shall submit a CV of the candidate to the Engineer for approval before the candidate is appointed as the traffic safety officer."

Insert the following as the opening phrase to subsubclause (i):

"make himself available to discuss road safety and traffic accommodation matters whenever required by the Engineer and shall be responsible …."

Delete subsubclauses (ii) and (iii) and replace with the following:

"(ii) Record on neat and dimensioned sketches and submit to the Engineer the position and sign reference number, where applicable, of each sign, barricade, delineator, cone, amber flicker light, guardrail and permanent or temporary painted road marking feature. The position of each shall be adequately referenced from the marker boards or other surveyed points on the site of the works.

These records shall also show the date and time at which the recorded traffic accommodation features were certified as correct by the traffic safety officer and shall be signed by the traffic safety officer before being submitted to the Engineer.

The records shall similarly account for whatever changes were made in the field. Such changes shall record the position of flagpersons and STOP/GO control men and their associated traffic accommodation equipment wherever used.

(iii) Personally inspect the position and condition of each traffic accommodation feature on the entire site of works twice each day, before sunrise and at sunset, to record all irregularities discovered and the remedial action taken, and to sign off as correct and submit to the engineer such record sheets by midday of the next working day. The traffic safety officer/s shall keep a duplicate book for this specific purpose.

The traffic safety officer/s shall also submit with this report the daily labour returns of flag persons, STOP/GO and traffic signal control men employed."

Add the following new subsubclauses:

"(ix) The traffic safety officer/s shall be equipped with a cellular telephone and shall have a vehicle and sufficient labour at his disposal 24 hours a day including all special non-working days, and shall not be utilized for other duties. He shall be directly answerable to the Contractor's site agent. The traffic safety vehicle shall be a truck with a capacity of approximately 1 ton and shall be equipped with a high visibility rear panel in accordance with the requirements of the SARTSM. The words "TRAFFIC CONTROL" shall be written on a warning sign in highly legible letters, not less than 150mm high, and the sign shall be mounted on the vehicle at least 1,5m above ground level. The proposed sign and letter dimensions shall be submitted to the Engineer for his approval.

The vehicle shall also be equipped with an amber-coloured flashing light of the rotating parabolic reflector type with a minimum intensity of 100 W. The warning light shall be switched on and the sign shall be displayed at all times when the vehicle is used on Site.

The traffic safety officer/s and his vehicle shall not be used for the transport of flagpersons and traffic light operators during the regular daily personnel changes.

The traffic safety officer/s shall have a direct line of communication at all times with the police and traffic officers responsible for the area within limits of the contract. The provision of the road safety vehicle, driver, labourers and the cost of the cellular telephone shall be deemed to be included in the rates tendered for item B15.16.

(x) The traffic safety officer/s shall ensure that all obstructions relating to the Contractor's activities are removed from the road before nightfall where applicable and/or as instructed by the engineer and that the roads are safe for night traffic.

(xi) In addition to the duties listed in paragraph B1502(i), the traffic safety officer/s shall also be responsible for the removal of broken down vehicles from the roadway and implementing actions requested by the traffic authorities with regard to the work to be carried out. He shall also be responsible for the erection and maintenance of all traffic signs necessary for the accommodation of traffic.

(xii) In the event of an accident, the road traffic safety officer/s shall record details of the accident in a written report, to a format which shall be agreed with the engineer accompanied by photographs and a neat sketch plan on which is shown identifiable permanent features, relevant dimensions and the position of all temporary road signs, barricades, delineators, flagpersons and any other devices used for traffic accommodation."

Add the following new subclauses:

"(j) Traffic diversions

The Contractor's attention is drawn to the heavy volume and speed of traffic carried on the affected roads and shall make due allowance therefore in his construction programme.

Traffic accommodation shall be carried out in strict accordance with the requirements of the South African Road Traffic Signs Manual (SARTSM) – Volume 2 – Chapter 13 : Roadworks Signing (June 1999). The method of accommodating traffic shall be in accordance with the layouts of the traffic-control facilities for the traffic diversions on the respective roads as shown in the South African Road Traffic Signs Manual (SARTSM) - Volume 2 Chapter 13, on the drawings or as directed by the Engineer.

The Contractor shall submit a drawing showing details concerning each traffic diversion to the Engineer for approval at least 7 days prior to the scheduled commissioning of such diversions to allow him sufficient time to inform and obtain the approval of the traffic officials of the relevant authorities concerned for such diversions.

(k) Parking of construction vehicles and plant

Where there is no working space off the road, construction vehicles may be parked on the shoulder only during working hours in which case flagpersons and traffic cones shall be utilised to warn public traffic of the hazard. During non-working hours all obstructions to traffic shall be removed from the road.

The parking of construction plant within the road reserve outside working hours will be permitted. The minimum clearance between the parked vehicles / plant and the edge of any carriageway shoulder shall be 5 metres.

(l) Staging of construction

The majority of the work to be done on this project will require working during day times, and staging of construction should therefore be planned accordingly within working times as stipulated below. The work in this Contract will necessitate traffic having to be deviated onto a reduced -width carriageway and channelized into traffic lanes routed past / through the construction work areas.

Amber flashing warning lights shall be placed on traffic lane deviations at night and when instructed by the Engineer to warn motorists of lane closures and occupation of lanes for work operation areas.

It is a condition of this contract that the Contractor shall programme and arrange for adequate accommodation of traffic within the following operational limitations:

(i) Individual work areas shall be clearly demarcated with traffic signs and delineators / cones as specified. No individual working area shall exceed 1 000 metres in length.

(ii) Only one traffic lane per direction may be closed to traffic at a time. Closure of a traffic lane or partial lane will only be permitted once the traffic control facilities and temporary traffic diversions / deviations have been approved.

(iii) A minimum single trafficable lane width of 3.1m on all roads shall be maintained.

(iv) Crossing of the median of dual carriageway roads by Contractor's plant and equipment shall not be permitted.

(iv) Signage which does not apply during construction shall be removed or effectively covered.

(v) Signage erected for traffic accommodation purposes which is not applicable (e.g. speed limits at weekends etc) shall be effectively covered.

(vi) Signs and traffic accommodation devices for closures shall always be placed furthest away from the work area first and then by working inwards in the direction of traffic.

(vii) On completion of the work remove delineators/cones/signs by starting at the work area and work outwards against the flow of traffic.

(viii) Before re-opening a lane to traffic after milling/surfacing operations have been completed, temporary road marking as specified shall be applied.

Any costs related to these construction limitations and restrictions will be deemed to be covered in scheduled rates.

If the road or carriageway is not in a safe trafficable condition over the full width at the end of each day's/night's work, the Contractor shall provide adequate flagpersons, signs, barriers, lights and necessary personnel / staff to ensure a reasonable free flow of traffic on the specified traffic lanes throughout the night and the whole period that the roadway is open to traffic.

(m) Failure to comply with the provisions

Failure or refusal on the part of the Contractor to take the necessary steps to ensure the safety and convenience of the public traffic, accommodation of traffic, plant and personnel in accordance with these specifications or as required by statutory authorities or ordered by the Engineer, shall be sufficient cause for the Engineer to deduct penalties as follows:

A fixed penalty of R5 000.00 per occurrence, including not adhering to the stipulated working times above, shall be deducted for each and every occurrence of non-compliance with any of the requirements of Section 1500 of the standard specifications and Section B1500 of the Project Specifications.

In addition a time-related penalty of R500.00 per day or part thereof over and above the fixed penalty shall be deducted for non-compliance to rectify any defects in the accommodation of traffic within the allowable time after an instruction to this effect has been given by the Engineer. The Engineer's instruction shall state the allowable time, which shall be the time in hours for reinstatement of the defects. Should the Contractor fail to adhere to

this instruction, the time-related penalty shall be applied from the time the instruction was given.

The failure of or refusal by the Contractor to construct and/or maintain diversions, barricades, traffic signs or road markings at the proper time, or to take the necessary precautions for the safety and convenience of public traffic as specified or instructed by the Engineer, shall be sufficient cause to suspend the Works until the required construction or maintenance has been completed to the satisfaction of the Engineer.

(n) Media releases and public relations

Where ordered by the Engineer, the Contractor shall inform the general public on matters relating to the intended road works, construction period and accommodation of traffic through media and press releases in local and regional newspapers, magazines, radio services and/or other forms of publicity. Costs incurred for such publicity releases by the Contractor will be reimbursed through item B15.03(p)."

B1503 TEMPORARY TRAFFIC CONTROL FACILITIES

Replace the first sentence of the first paragraph with the following:

"The Contractor shall provide, erect and maintain the necessary traffic-control devices, road signs, channelization devices, barricades, warning devices and road markings (hereinafter referred to as traffic-control devices) in accordance with the Project Specifications, the SARTSM and as shown on the drawings and remove them when no longer required. It shall be incumbent upon the Contractor to ensure that the abovementioned traffic-control devices are present where required at all times and are functioning properly."

Replace the third paragraph with the following:

"The type of construction, spacing and placement of traffic-control devices shall be in accordance with the SARTSM. The recommended arrangements of the traffic control devices illustrated and/or drawings issued by the Engineer shall not be departed from without prior approval of the Engineer. The arrangements expected to be most commonly used in the contract are given on the tender drawings. In areas of high traffic density, the assistance of the relevant traffic authorities officials shall be solicited.

The details shown for spacing and placement of traffic-control facilities may however, be revised at the discretion of the Engineer where deemed necessary to accommodate local site geometry and traffic conditions."

(a) Traffic-control devices

Add the following at the end of the last paragraph:

"At each traffic control point, an all-weather shelter of at least three (3) square metres capable of accommodating two operators, with a clear window, a stable door, two chairs and a portable chemical toilet that shall be regularly maintained, shall be provided. Each control point shall have a generator (with back-up power supply) and a 2x400w metal halide floodlight mounted onto a 9m winched fiberglass pole bolted to a 1,5m buried galvanized stem to light up the traffic control point at night time. Another floodlight/pole shall be placed some 20 metres apart from the traffic control point to extend the lighting along the road as a measure of safety for motorists in stacking / queuing vehicles at night."

(b) Road signs and barricades

Add the following:

"The Contractor shall be responsible for the protection and maintenance of all signs and shall at his own cost replace any that have been damaged, lost, or stolen.

All temporary road signs required to remain in position for some time shall be pole mounted as shown on the drawings. All temporary road signs required to be moved more often shall be mounted on portable supports for the easy moving of signs to temporary positions. The only permitted method of ballasting the sign supports shall consist of durable sandbags filled with sand of adequate mass to prevent signs from being blown over by wind. Sandbags shall be placed as ballast on the supports in front of and behind the sign so as not to obstruct the traffic path past the sign. The cost of the sandbags shall be included in the tendered rates for the various types of temporary road signs.

The covering of permanent road signs, if applicable, shall be by utilizing a hessian bag that shall be pulled over the sign in the form of a hood and fastened to the signposts. Plastic bags or other materials and fastened by means of adhesive tape shall not be permitted. The cost of covering of permanent road signs shall be included in the tendered rates of items 15.01 and 15.10."

(c) Channelisation devices and barricades

Add the following:

"The use of drums as channelisation devices shall not be permitted. Drums may however be used to set up barriers as provided for in sub clause 1503(d).

Traffic channelisation shall be carried out by means of plastic type delineators (Sign TW401 / TW402) in accordance with SABS 1555. The sign face shall be 200mm x 800mm in size and shall be mounted on suitable non-metal bases. Each base shall be suitably ballasted with sandbags.

Delineators shall:

(i) comply with the manufacturing and reflective requirements of the SARTSM and the blades shall be reversible with dimensions as indicated on the drawings;
(ii) have smooth and round edges and be mounted on a post and base. All components shall be of durable plastic material;
(iii) have the lower edge of the reflective part of the delineator mounted not lower than 250mm above the road surface;
(iv) be capable of withstanding the movement of passing vehicles and gusting winds up to 60km/h in typical working conditions without falling over. To achieve this, the base shall be at least 0,18m^2 and ballasted by sandbags filled with sand;
(v) together with its mounting be designed such that it will collapse in a safe manner under traffic impact.

Traffic cones manufactured in a fluorescent red-orange or red plastic material may be used only for roadmarking operations and other short-term lane deviations during daylight. Cones used on deviations shall be 750mm high on Trunk Roads and 450mm high on other roads with suitable heavy bases to prevent the cones from being blown over by wind or turbulence from moving traffic.

Lane closures or traffic diversions that continue into night-time shall be demarcated by delineators."

(e) Warning devices

Add the following after the first paragraph:

“At night and when directed by the Engineer, amber flashing warning lights shall be placed at strategic places such as barricades, obstructions, etc. The warning lights shall be "Vama SA" amber flashing lights or an equivalent type.

All construction vehicles and plant used on the works shall be equipped with rotating amber flashing lights in working condition and warning boards as specified. All vehicles and plant before being allowed on the site shall obtain a clearance permit from the Engineer.

(i) Vehicle mounted flashing lights

Rotating lights shall have an amber lens of minimum height of 200mm of the revolving parabolic reflector mountable type and shall be mounted in such a way as to be highly visible from all directions. The lights on construction vehicles shall not be switched on while vehicles are being operated on unrestricted sections of a public road, but shall be switched on while construction vehicles are operating within the accommodation of traffic area, as the vehicles decelerate to enter a construction area, and as the vehicles accelerate to the general speed when entering the road from a construction area. Lights on plant shall operate continuously while the plant is working alongside sections of road open to public traffic.

All LDV's and cars operating on Site shall also be equipped with rotating amber flashing lights which shall be placed so as to be highly visible and operated continuously while the vehicles are manoeuvring in or out of traffic or are travelling or parked alongside roads open to public traffic.

Rotating lights and the "CONSTRUCTION VEHICLE" signs on the Contractor's vehicles and plant shall not be paid for separately but shall be included in the rates covering the use of the vehicles.

The Contractor shall apply and maintain lights together with temporary mounting brackets, to the approval of the Engineer. Vehicles and plant that do not comply with these requirements shall be removed from the site.

(ii) Sign mounted flashing lights

Two amber flashing lights shall be vertically mounted on top of the traffic signs at each end of each traffic accommodation section as shown on the drawings. The lights shall be operated during the hours of darkness.”

(iii) Amber flashing lights for the Engineer

The Contractor shall supply and maintain similar rotating amber flashing lights with a magnetic base, flexible cable and connection suitable for insertion into a standard 12V automobile cigarette lighter socket for the Engineer and his staff.

The provision and maintenance of rotating amber flashing lights for the use of the Engineer and his staff shall be paid under Item B15.15.”

Add the following new subclauses:

“(g) Other traffic control measures ordered by the Engineer

The Engineer may instruct the Contractor to provide any other road sign, reflective tape, etc not measured in standard pay items. Such road signs shall conform to the requirements of the SARTSM, or specification provided by the Engineer. Similarly, in order to ensure that the travelling public is kept fully informed and warned on matters relating to the accommodation of traffic, construction sign posting and the effect of the construction on the free flow of traffic through the site, the Engineer may arrange for advertising in the press and/or for other forms of publicity.

(h) Flagpersons

Flagpersons shall be provided where shown on the drawings or required by the specification. At least two flagpersons shall be provided at each traffic control point in addition to the STOP/GO sign operator, one flagperson at the 40km/h sign and a second roving flagperson to indicate to the traffic at the end of the queue to stop. At night time closures flagpersons will be equipped with a Stromberg Lightman xenon strobe, or equivalent approved, and a torch is required at each traffic control point as well as the traffic light operator. Where the shoulder of the road is closed to traffic, a flagperson shall be provided at the leading end of the closure. This flagperson shall be provided at the 60km/h sign to warn the traffic about the closure. No flagperson shall be on duty for a period of more than 10 hours per shift.

Flagpersons shall be adequately trained in the standard flagging techniques as described in the SARTSM (refer to figure 13.23 of detail 13.23.1) and be provided with conspicuous clothing such as safety jackets utilizing retro-reflective and / or fluorescent panels in red, yellow and / or white.

Flagpersons shall have in their possession, at all times, certification that they have attended and passed an accredited course in flagging techniques before being allowed onto the construction site.

Flags shall be made from bright red or red-orange material and shall be square with a minimum side length of 600mm. The flag shall be attached to a staff at least 1.0m in length.

In terms of lateral clearance and safety, flagpersons shall stand on the shoulder of the lane of traffic that is being controlled and under no circumstances shall flagpersons be permitted to stand within the traffic lane. In order to obtain maximum visual impact for the travelling public, flagpersons shall stand-alone.

(i) Temporary traffic-control signal systems

A complete traffic control signal system shall consist of four traffic control signals each with three aspects, and shall include the control devices, power supplies and mountings.

Temporary traffic-control signals shall be erected where directed by the Engineer and shall comply with the following requirements:

(i) The provisions of SARTSM, Volume 4, Chapter 10.
(ii) The signals shall be capable of operating under manual control and if required linked manual control. Amber times shall be a minimum of 3 seconds.
(iii) The signals and the power supply shall be capable of operating under all weather conditions for uninterrupted periods of at least 15 hours.
(iv) Standard signal faces with 210mm diameter red, amber and green aspects shall be provided.
(v) The traffic-control signal lights shall comply with SABS 1459-1988. Aspects shall be fitted with 50 W tungsten halogen lamps.

(vi) Two standard signal faces, both erected on the centreline of the road, shall be provided to control each direction of traffic.

Traffic-control signal systems shall be used during the period of half an hour before sunset to half an hour after sunrise every day and shall be operated manually. Sufficient staff, equipped with two-way radios, shall be provided to operate the traffic-control signal system, in shifts of not more than ten (10) hours. The same personnel shall not be on duty throughout an entire night.

The Contractor shall provide a backup power supply such that the traffic control signals can be operated continuously at night time. In addition the Contractor shall have available on Site adequate spares to effect immediate repairs to a traffic control signal unit in the event of breakdown.

(j) Maintenance

All temporary traffic control facilities shall be kept clean and maintained in good order at all times.

If the coefficient of retro-reflection of any of the Contractor's signs falls below 80% of the value given in Table 1 of CKS 191 - 1987 (observation angle 0.33, entrance angle 5.0) for the grade and colour of the material used the sign shall be considered defective and shall either be rectified or removed and replaced.

(k) Sufficiency

The Contractor shall determine, from his proposed programme, the number of temporary traffic-control facilities required and shall not commence with any accommodation of traffic before sufficient traffic-control facilities have been delivered to the site.

The Contractor shall keep sufficient surplus barricades, signs and delineators on or around the site to allow for the replacement of damaged or missing items within a period of two (2) hours of the deficiency being discovered.

The Contractor shall allow in his tendered rates for the replacement of five (5) percent of the traffic-control facilities scheduled. This percentage is to allow for the replacement of traffic-control facilities which become unserviceable or damaged by public traffic or stolen and is beyond the Contractor's control and not the result of his actions or omissions during the period of accommodation of traffic on the site. The replacement of traffic control facilities over and above this five (5) percent of the scheduled items damaged by public traffic or stolen shall be payable at tendered rates."

B1504 WIDTH AND LENGTH OF TEMPORARY DEVIATIONS

Replace the second paragraph with the following:

"Where the existing road is repaired, resurfaced or reconstructed in half widths, the roadway width for accommodating one-way traffic shall be at least 3.1m wide. The length of the half-width construction shall not exceed the length of road that can be milled and replaced in one day so that traffic will be able to use the section of road under consideration before the pm peak of the same day.

The half-width traffic accommodation shall be single direction controlled by STOP and GO/RY signs during the daytime and temporary traffic-controlled signal systems at night."

B1517 MEASUREMENT AND PAYMENT

Item		Unit
B15.03	**Temporary traffic-control facilities**	
(a)	Flagmen	man-day
(b)	Portable STOP and GO-RY signs	No

Replace the first paragraph of the payment clause with the following:

"The unit of measurement shall be a 9-hour (minimum) shift worked by a flag person. A man-day shall be deemed to comprise one shift. The rate shall be deemed to cover day and night work, including work on Saturdays and Sundays."

Replace subitems (g) and (h) with the following:

Item		Unit
B15.03	**Temporary traffic-control facilities**	
(g)	Road signs, STW-, DTG-, TGS-, TG- and TIN-series ((excluding delineators and barricades)	m^2
(h)	Delineators (W401 or W402) (200 mm x 800 mm sides) complete with stand and ballast:	
(i)	Single sided	No
(ii)	Double sided	No

Add the following to the payment clause of item 15.03(h):

"In the case of subitem (h) it shall also include for the sign stand, for the provision of two sandbags per delineator to hold it in position and for their replacement when necessary."

Add the following new pay subitem:

Item		Unit
B15.03	**Temporary traffic-control facilities**	
(n)	Other traffic control measures ordered by the Engineer:	m^2
(i)	Provision of other traffic control measures	No
(ii)	Contractor's handling costs, profit and all other charges in respect of subitem B15.03(n)(i)	%

Expenditure under this item shall be made in accordance with the general conditions of contract, Subclause 6.6 (GCC 2015), for the supply and installation of any additional signs, all other traffic control measures ordered by the Engineer in accordance with Clause B1503(g) and for expenditure regarding media releases and public relations.

The tendered percentage is a percentage of the actual amount spent under subitem B15.03(n)(i), which shall include full compensation for the handling costs of the Contractor, and the profit in connection with providing other signs, all traffic control measures ordered by the Engineer, and expenditure regarding media releases and public relations.

Amend the paragraph headed "General" to read:

“The tendered rates for the respective traffic-control facilities shall include full compensation for the supply and initial erection complete with posts, stakes, portable stands and sandbags as may be required, for clearing, for their maintenance and the replacement of items which have become unserviceable due to normal wear and tear, and their removal when no longer required. As stated in subclause B15.03(k), the Contractor shall allow in his tendered rates for the replacement of at least five (5) percent of the traffic-control facilities scheduled. This percentage is to allow for the replacement of traffic-control facilities which become unserviceable or damaged by public traffic or stolen and is beyond the Contractor's control and not the result of his actions or omissions during the period of accommodation of traffic on Site. The replacement of traffic control facilities over and above these five (5) percent of the scheduled items damaged by public traffic or stolen shall be payable at tendered rates. 75% of the tariff will be payable when the items have been provided and erected in position for their first use on Site and 25% when finally removed from the site.

The tendered rate for sub-item (h), delineators, shall also include full compensation for moving these signs laterally (as required or instructed by the Engineer) as specified in Subclause B1503(c) so as to widen the travelled way when work is not in progress on that part of the section that is closed, or vice versa.”

Item	**Unit**
B15.16 Provision of traffic safety	month

The unit of measurement shall be the month (or part thereof) that the specified duties of the traffic safety officer are performed, irrespective of the number of traffic safety officers employed in any 24 hour day.
The tendered rate shall include full compensation for the cost of the traffic safety officer(s) to conduct the duties as specified in sub-clause B1502(i) and includes the provision of his own vehicle, fuel, vehicle maintenance and insurance and the cost of the cellular telephone and all other incidentals related to the performance of his duties.

SECTION B1600: OVERHAUL

B1601 SCOPE

Replace this clause with the following:

"This section covers the haulage of material to the dedicated stockpile or spoil sites as instructed by the engineer. It also covers the cost of tipping at these spoil sites. "

B1602 DEFINITIONS

(a) Overhaul material

Add the following:

"Overhaul shall not apply in the case of:

(i) Material obtained from commercial sources or sources provided by the Contractor.
(ii) Material to be disposed of to commercial spoil dump sites or approved spoil dump sites provided by the Contractor off the site of the Works.

The Contractor's tendered rates for all materials from commercial sources or other Contractor sources of supply shall be deemed to include full compensation for hauling the materials to its point of use on the site of Works. The Contractor shall make his own arrangements for the procurement of materials and shall pay all royalties and other costs in this connection.

Where material is required to be spoiled, the Contractor shall pay any dumping charges which may become payable."

(b) Overhaul

Delete the sub clause and replace with:

"Payment shall only be made for material hauled in excess of 1 kilometre. Overhaul shall be measured as the product of the compacted in-situ volume of material hauled and the overhauled distance."

(c) Haul distance

Add the following:

"The haul distance of any material shall be measured along the shortest route from the place of excavation (origin, source) to the point of use (should the material be used / re-used directly) or to the approved stockpile, and the shortest distance from the approved stockpile to the point of use."

(d) Free-haul distance

Replace this clause with the following:

"The free-haul distance shall be the distance up to which overhaul material may be hauled before overhaul becomes payable. The free-haul distance on any and all materials taken to spoil or stockpile on or off the site shall be 5.0km. In the case of material hauled to a stockpile and then hauled again for re-use, the free-haul distance shall apply only once."

B1603 MEASUREMENT AND PAYMENT

Note to tender:
Wherever this pay section has been used for measurement and payment purposes it has been included as part of the payment section of the relevant pavement layer which is to be constructed and/or from which material is generated for removal to spoil. For example, material procured from borrow that is hauled beyond the free-haul limit for use in a gravel layer shall be measured for payment under section 3400: PAVEMENT LAYERS OF GRAVEL MATERIAL as 16.02/34.01, 16/34.02 etc., whichever is the relevant pay item under section 3400.

SECTION B1700: CLEARING AND GRUBBING

B1701 SCOPE

Add the following as a final paragraph:

"Clearing and grubbing for the construction of site offices shall not be measured separately and shall be deemed to be included in the rates tendered for item B13.01."

B1702 DESCRIPTION OF WORK

c) Conservation of topsoil

Add to the end of the 1st paragraph:

"The depth of topsoil removed shall be reliant on the terrain, suitability of material and topsoil requirements of the work. Generally the contractor will not be required to remove topsoil to more than an average depth of 400mm unless approved by the engineer before commencing with topsoil removal from any particular area."

Replace the second paragraph of this clause with the following:

"After clearing and grubbing, all topsoil shall be removed to either windrows alongside the construction area or to stockpile. Where ordered by the engineer, any topsoil that shall be required for the topsoiling of new banks and cuts, but which cannot be accommodated within the construction site, shall be loaded and hauled to the designated stockpile area where it shall be placed in temporary stockpiles for later use in the rehabilitation of the site affected by construction activities. Where new borrow pits are to be opened up the topsoil shall first be removed (independently of the overburden) and placed in temporary stockpiles at the edge of the borrow pit. The moving of topsoil from windrow or the loading of topsoil from temporary stockpiles and the placing and spreading thereof on cut or fill slopes or on borrow pit spoil sites, is covered in Section 5800."

SECTION B1800: DAY WORKS

B1801 SCOPE

This section covers the evaluation and method of measurement and payment for work, ordered by the Engineer in writing, carried out on a daywork basis, all in accordance with subclause 6.5 (GCC 2015) of the General and/or Special Conditions of Contract.

B1802 GENERAL REQUIREMENTS

Work will be classified as daywork only if the Engineer considers no other rate in the schedule of quantities appropriate for payment purposes.

Only work ordered in writing by the Engineer to be executed as daywork shall be measured and paid for at the rates tendered in the schedule of quantities.

The Contractor shall keep and submit records of the work performed in accordance with the requirements of 6.5.4 (GCC 2015) of the General and/or Special Conditions of Contract.

B1803 LABOUR

The tendered rates for labour to be included as daywork charges shall include the salaries and wages of gangers or charge hands working with their gangs but shall exclude the costs of the time of the foremen or supervisors which will be deemed to have been included in the sums tendered for the relevant items in Section 1300 of the schedule of quantities.

Gross remuneration, as specified in subclause 6.5.1.2.1 (GCC 2015) of the general and/or special conditions of contract, will be deemed to include the following:

(a) Basic salary/wage

(a) Overhead charges such as fringe benefits not reflected in basic salary and wages which may include:

normal annual bonus
Employer's contribution to medical aid
group life assurance premiums
Employer's contribution to pension/provident fund
all other costs as per letter of appointment

and costs payable due to statutory requirements, which may include:
Workmen's Compensation Fund contribution
Unemployment Insurance Fund contributions
District Council levies or the equivalent thereof

The rates tendered for labour shall include for the actual cost of salaries and wages, all overhead charges, profit, liabilities, obligations, risks and incidentals for all workmen to execute work by dayworks.

B1804 MATERIALS

The nett cost price of materials (exclusive of VAT) actually delivered to the site to be included as daywork charges shall include the costs of delivery to the usual points at which materials are received on the site.

Before ordering any material, the Contractor shall submit quotations to the Engineer for his approval, and shall submit such receipts or vouchers to the Engineer as may be necessary for proving the amount claimed.

The percentage tendered as an on-cost on the net cost price of materials shall include for all handling, overheads, profit, liabilities, obligations, risks, incidentals and other on-costs for the supply, delivery and distribution of material for daywork to the individual site(s) where daywork is in progress.

B1805 PLANT

The full inclusive hourly cost of operational plant which is available on Site or which has been removed without written authorization of the Engineer, to be included as daywork charges will be taken to be the tendered rate which, in the opinion of the Contractor, will be applicable in all respects to the situation and terms of the contract.

The hourly rate tendered or agreed shall constitute the daywork rate for the plant and will be deemed to include all costs for plant operators, consumable stores, fuel, maintenance, depreciation, ground-engaging tools and all other incidentals necessary to operate the plant for the purposes for which it was designed.

Failure on the part of the Contractor to state in the schedule of quantities the plant on which his tender is based, shall be considered as a firm agreement on the part of the Contractor that he waives all rights to distinguish between the different types and capacities of plant falling within the description and/or category given, and the Engineer shall have the right to call upon the Contractor to supply any such plant to the site and perform the work as directed by him at the particular tendered rate.

Sixty percent (60 %) of the hourly rate tendered or agreed will be paid in respect of plant which is being employed for daywork, but standing idle on the specific instructions of the Engineer, as full compensation for idle costs of daywork plant.

For plant not on Site, the costs of establishing items of plant on the site for daywork on specific instruction of the Engineer will be negotiated with the Contractor at the time that such daywork is contemplated.

B1806 MEASUREMENT AND PAYMENT

Item		Unit
B18.01	**Personnel:**	
	(a) Personnel during normal working hours:	
	(i) Unskilled labour	Hour
	(ii) Semi-skilled labour	Hour

(iii) Skilled labour	Hour
(iv) Ganger	Hour
(v) Flagperson	Hour
(b) Extra over B18.01(a) for night works	
(i) Unskilled labour	Hour
(ii) Semi-skilled labour	Hour
(iii) Skilled labour	Hour
(iv) Ganger	Hour
(v) Flagperson	Hour
(c) Extra over B18.01(a) for Sundays and other special non-working days:	
(i) Unskilled labour	Hour
(ii) Semi-skilled labour	Hour
(iii) Skilled labour	Hour
(iv) Ganger	Hour
(v) Flagperson	Hour

The unit of measurement shall be the hour of time worked by the employee on the designated work on instruction by the Engineer.

The daywork rates submitted for labour in the schedule of quantities shall be the cost of labour for each skill level and shall apply only to the number of workers approved in writing by the Engineer.

The rates shall be for normal working hours and shall be increased pro rata for overtime at the standard rate applicable if the work performed outside working hours is approved in writing by the Engineer.

The tendered rates shall include full compensation for all costs for salaries and wages, use and maintenance of tools and equipment, sick pay, leave pay, holidays with pay and financial charges of any description incurred by the Contractor and his subcontractors as well as for all insurance, accommodation, travelling, travelling time, supervision, overheads, profit, obligations, risks and any other emoluments and incidentals necessary for labour to execute work as daywork.

Payment for expenditure under this item will be made in full as and when the money is expended subject to written proof by the Contractor of payment of invoiced amounts.

Item **Unit**

B18.03 Contractor's Equipment

(a) Tipper trucks:	
(i) 6m^3	hour
(ii) 10m^3	hour
(b) TLB	hour
(c) Loader (0.5m^3 bucket)	hour
(d) Walk-behind roller (Bomag BW90)	hour
(e) Water Bowser (5000l)	hour

The unit of measurement shall be the hour actually worked by each item of plant (vehicle, machine or equipment) on the designated work on instruction by the Engineer.

The Contractor and the Engineer will agree on the method of recording the working hours prior to the commencement of work. Any long period of idling at any one time which in the opinion of the Engineer or his representative is beyond that required for normal operating conditions will not be paid for as working time. Non-working hours for any reason shall not be measured for payment.

The tendered rates include full compensation for furnishing and using the plant, including the cost of plant operators, consumable stores, fuel, ground-engaging tools, maintenance and for all other incidentals necessary to execute the authorised daywork as specified.

Where there is ambiguity between the power developed at the flywheel and mass of machine, the power shall govern the measurement category.

Item	**Unit**
B18.04 Transport	
(a) LDV (1 Ton)	km
(b) Flatbed truck (5 Ton)	km
(c) Lowbed truck max (30 ton)	km

The unit of measurement shall be the kilometre distance that the vehicle travelled for transporting personnel and/or plant/equipment. All travelling shall be approved by the engineer.

The tendered rate shall include full compensation for the cost of the vehicle including fuel, maintenance, depreciation and running costs.

The above mentioned tendered rates shall be full compensation for the various items as specified and no further profit shall be paid.

COLTO SERIES 2000: DRAINAGE

SECTION B2100: DRAINS

B2101 SCOPE

Amend the first paragraph to read:

"This section covers all work both rehabilitative and new work in connection with the excavation and construction of open drains, subsoil drainage and banks and dykes at the locations and to the sizes, shapes, grades and dimensions as shown on the drawings or as directed by the engineers, and the test flushing of subsoil drains."

B2104 SUBSOIL DRAINAGE

a) Materials

(i) Pipes

Amend this sub-clause by adding the following to the end of the third paragraph:

"(category-heavy duty) or SABS 1601 (stiffness class 350)

The pipes to be used shall be either slotted u PVC pipes or perforated HDP pressure pipes, 100mm ID."

Pipes must be stored in a shaded area without exposure to direct sunlight.

(ii) Natural permeable material

Add the following to the 3rd paragraph:

"The crushed stone shall be fine (14mm nominal) or coarse (20mm nominal) and shall be washed clean of all fines"

(iii) Synthetic-fibre filter fabric

Under item (4) Selection, of this sub-clause, replace the 1st paragraph with the following:

"The filter-fabric used for subsoil drains shall be grade ..... and shall satisfy the criteria for this grade of geotextile as given in Table 2104/2."

Add the following item:

"(5) Testing

General:

The tests to be carried out on geo-textiles relate to the material and the method of manufacture and are mainly to ascertain that the correct

grade of geo-textile is supplied, and that the material is equivalent in quality to that selected and specified for use in the works. The contractor will be required, on the request of the engineer, to submit a certificate by an approved laboratory to prove compliance with specified tests as stated in B8114 without additional cost to the employer.

b) Construction of subsoil drainage systems

Add the following sub-clause:

"(v) Proving of pipes in subsoil drainage systems

On completion of the pipe laying and prior to backfilling, all pipe joints shall be surveyed as proof of their installation to line and level. After backfilling the pipes shall be proved by pulling through a cylindrical cleaning brush followed by a wooden mandrill ± 400mm long and 5mm in diameter less than the bore of the pipe. Proving of pipes shall not be paid for separately and the cost thereof shall be deemed to be included in the rate tendered for laying the pipe."

B2106 MANHOLES, OUTLET STRUCTURES AND CLEANING EYES

Insert the following paragraph after the last paragraph:

"The end of each subsoil outlet shall be marked with a 300mm x 300mm perspex plate fixed to the top portion of the fence line opposite each subsoil outlet structure in accordance with the details on the Drawings."

B2107 MEASUREMENT AND PAYMENT

Item **Unit**

B21.01 Excavation for open drains

Add the following to the penultimate paragraph:

"The tendered rate shall covers the haulage of material to the dedicated stockpile or spoil sites as instructed by the engineer. It also covers the cost of tipping at these spoil sites. "

Item **Unit**

B21.04 Impermeable backfilling to subsoil drainage systems

Add the following sub-items:

"(a) Unstabilised natural gravel ..... cubic metre (m^3)

(b) Unstabilised G5 material ..... cubic metre (m^3)"

Amend pay items B21.12 to read as follows:

B21.12 Concrete outlet structures, manhole boxes, Junction boxes, and cleaning eyes for subsoil drainage systems number (No)"

Add the following:

"The tendered rate shall also include full compensation for procuring and finishing the galvanised woven wire mesh, cutting, waste, installing the wire mesh at outlets and keeping the wire mesh in the pipe openings clean for the duration of the contract period."

Add the following payment items:

"Item **Unit**

21/B16.01 Overhaul for material hauled in excess of 1,0 km free-haul (normal overhaul) cubic metre cubic metre (m^3)

"The tendered rate shall include full compensation for all labour and tools required for removing the material. Payment shall only be made for material hauled in excess of 1 kilometre. Overhaul shall be measured as the product of the material excavated hauled and the overhauled distance."

Item **Unit**

B21.20 Subsoil outlet marker board ..... number (no.)

The unit of measurement is the number of 300 mm x 300 mm perspex plate subsoil outlet marker boards fixed to the top portion of the fence line opposite each subsoil outlet structure in accordance with the details on the Drawings.

The tendered rate shall include full compensation for procuring and furnishing the subsoil outlet marker board, galvanizing and fixing the board to the fence.

Item **Unit**

B21.21 Class 20/20 cast in situ concrete for the encasing of subsoil drainage systems, including formwork ..... cubic metre (m^3)

The unit of measurement is the cubic metre of class 20/20 concrete provided and placed for the encasing of pipes in subsoil drainage systems, in accordance with the details on the drawings or as instructed by the Engineer.

The tendered rates shall include full compensation for all excavation, backfilling, compacting to 90% of MDD, disposing of surplus excavated material (including all haul), keeping the excavations safe, dealing with surface or subsurface water, procuring and furnishing all materials, mixing, transporting, placing and curing the concrete, and all labour and constructional plant required to construct the encasing of pipes, complete.

Item **Unit**

B21.22 Galvanized wire mesh at outlets of subsoil drainage systems

..... number (No)

The unit of measurement is the number of 250 mm x 250 mm squares of galvanized woven wire mesh built into the outlets of subsoil drainage systems in accordance with the details on the drawings.

The tendered rate shall include full compensation for procuring, furnishing and cutting the galvanized woven wire mesh, inclusive of any waste, as well as installing the mesh in the pipe openings. Also included in the rate shall be all associated costs necessary to keep the wire mesh in the pipe openings clean for the duration of the contract period."

Item **Unit**

SECTION B2200: PREFABRICATED CULVERTS

B2201: SCOPE

Add the following:

"This section also covers the replacing and/or lengthening of existing culverts, modification of and repairs to existing catch pits."

B2202 TYPES OF CULVERTS

B2203 MATERIALS

b) Portal and rectangular prefabricated concrete culvert units

Replace this sub-clause with the following:

"Precast concrete units shall comply with the requirements of the latest SANS 986:2006 specification.

Prior to the manufacture of any units the manufacturer shall submit his Quality Plan to be approved by the engineer before delivery of any units to site. As part of the Quality Plan submitted for approval copies of calibration certificates of both gauges used for proof loads and cover meters used at the factory shall be supplied to the engineer. The originals of these certificates shall at all stages also be available for inspection at the factory premises. The manufacturer shall check each precast unit for cover compliance, and random checking of units shall not be permitted. The engineer's representative may visit the factory at any stage to ascertain adherence to the quality plan as well as to check covers before delivery to site. Any substandard cover shall result in the batch being rejected. Should the manufacturer not be adhering to their Quality Plan the engineer may exercise the right to reject the use of products from the manufacturer concerned. The Employer shall also be informed in all such cases.

For durability requirements due to the reduced cover provided for pre-cast culverts all durability testing shall be done in accordance to Clause B6404(h) shall fall within the severe category. For units within the 5km zone from the coast the very severe category shall be used and increased cover shall be as specified by the engineer."

B2204: CONSTRUCTION METHODS

Replace the 2nd paragraph with the following:

"Culverts shall generally be lengthened according to the "embankment method". The contractor shall at all times ensure that the existing drainage is at all times maintained and any damage caused as a result of blocked culverts during construction shall be repaired at the contractor's expense.

New culverts shall generally be constructed according to the “trench method” unless otherwise indicated on the drawings.

The bottom of the excavation for culverts that are to be replaced or lengthened shall be inspected by the engineer prior to the placing of the bedding material. If the material is found to be suitable, it shall be ripped to a depth of 150mm below the bottom of bedding level and re-compacted to at least 93% Mod. AASHTO density.

Where the material is found to be unsuitable, it shall be removed to a depth specified by the engineer and then replaced with selected material compacted to at least 93% Mod. AASHTO density in layers not exceeding 150mm thickness."

B2215 SERVICE DUCTS

Insert the following at the end of the 1st paragraph:

”(v) **HDPE Sleeve Pipes**

HDPE sleeve pipes shall be:

1. Corrugated cable ducts complying with the requirements of SANS IEC 61386-24: 2005 for sleeves to be laid in trenches.
2. HDPE pipes for drilling shall be manufactured from PE63 – PN4 and shall comply with the requirements of SANS 427.”

Insert the following as a new 4th paragraph

“Where drilling is required for installation of service ducts, a drilling pit shall be excavated on the one side of the road from where drilling is to be conducted. The pit shall be of adequate size to permit free standing of the operator and drilling equipment. On the other side of the road, a receiving pit is to be excavated. Both pits shall be backfilled after completion of the drilling, using the excavated material compacted in 150mm layers to a minimum density of 93% of modified AASHTO. Drilling shall be carried out from the one side of the road in positions and to levels as shown on the drawings and/or as instructed by the engineer. The hole shall be of adequate size to accommodate the required service duct. The permissible deviation in level of the hole between the two sides of the road shall not exceed 500mm. The service duct shall be installed through the drilled hole and shall be extended to above ground.”

Add the following at the end of the penultimate paragraph

“Before closing, all sleeves or ducts shall be proved as specified in sub-sub-clause B2104(b)(v).”

B2218 MEASUREMENT AND PAYMENT

Item		**Unit**
B22.01	**Excavation**.....	

Add the following sub-item:

"Item		**Unit**
(b)	Extra over subitem 22.01(a) for excavation in hard material, irrespective of depth	m^3

The unit of measurement for B22.01 (b) shall be the cubic metre of material excavated by means of labour using hand tools only. This item shall only apply where the dimensions of the area to be excavated are such as to render excavation by machinery impractical and where the engineer has specifically ordered or authorised excavation by hand. This item shall not apply where machine excavation would have been possible but the contractor chooses to use hand excavation instead.

The tendered extra-over rate shall include full compensation for all additional costs in excavating the material using hand held tools.

Item **Unit**

B22.02 Backfilling:

Amend sub-payitem as follows

(a) Using the excavated material..... cubic meter (m^3)

(b) Extra-over Using imported selected material (G7 quality) cubic meter (m^3)

(c) Extra-over sub-items 22.02(a) and (b) for soil cement backfilling (with 5% Cement)……..... ……..cubic meter (m^3)"

B22.03 Concrete pipe culvert:

(b) On Class B bedding:

Add the following sub-pay item

"(1) Type SC 100 D-Load pipes with spigot and socket joints including rolling rubber rings:

600mm diameter .....meter (m)

750mm diameter .....meter (m)

900mm diameter .....meter (m)

Item ..... Unit

B22.13 Removing existing concrete

"The tendered rate shall include full compensation of all demolition and loading, transporting and disposing of products of demolition, including a free haul of 1,0 km. "

Item **Unit**

B22.14 Removing and stacking existing prefabricated culverts (all sizes)

"The tendered rate shall include full compensation for lifting, loading, transporting to stack, off-loading and stacking the prefabricated culverts and disposing of products of demolition, including a free haul of 1,0 km. "

Amend the pay item as follows:

"Item **Unit**

B22.17 Manholes, catchpits, precast inlet and outlet structures complete including covers and frames:

a) Manholes at direction change:

i.	900mm	Number (No)
ii.	1200mm	Number (No)
iii.	Chamber: 1750 x 1580m	Number (No)

b) Kerb inlets:

i.	Kerb inlet 2m long complete, including 6m transitions (No)	Number
ii.	Kerb inlet 4m long complete, including 6m transitions, (No)	Number

The unit of measurement, in the case of subitems (a), (b) and (c) above, shall be the complete unit as shown on the drawings, including all concrete, brickwork, covers, frames, grids and other accessories.

The tendered rates shall include full compensation for procuring, furnishing and installing, and laying where applicable, the complete units except for excavation and backfilling, which shall be measured separately.

The tendered rate shall also include full compensation for connecting up to and building any conduits into the walls of the various structures.

Item **Unit**

B22.23 Service ducts

Add the following sub payment item:

"(c) Installation by drilling (type and diameter indicated) ..... metre (m)

The tendered rate for (c) shall be as for (a) or (b) and shall also include full compensation for all labour and equipment for the complete drilling process. Any requirement for shoring shall be paid under payment item B61.51."

Item **Unit**

B22.24 Utility Maker

Change the description of item 22.24 to read as follows:

B22.24	Utility marker, class 30/19 concrete, complete as shown on the drawings	Number

Item	**Unit**

Amend the payitem as follows:

"Item	**Unit**
B22.27: Reinstating the trenches crossing roads:	
(a) Roadbed preparation and compaction of material	
(i) Compaction to 90% of modified AASHTO density	Cubic Metre (m^3)
(b) Gravel selected layer G9 (150mm)	
(i) Compaction to 93% of modified AASHTO density	Cubic Metre (m^3)
(c) Gravel Selected Layer G7 (150 mm)	
(i) Compaction to 93% of modified AASHTO density	Cubic Metre (m^3)
(d) Gravel subbase layer G6 compacted to C4 (150mm)	
(i) Compaction to 96% of modified AASHTO density	Cubic Metre (m^3)
(e) Gravel base layer G3	
(i) 100% of modified AASHTO density (150mm compacted layer thickness)	Cubic Metre (m^3)
(ii) Chemical stabilizing agent (1) Ordinary Portland Cement	Tonnage (t)
(f) Bituminous surfacing (including tack coat) (30mm)	
(i) Prime Coat (1) Invert Bituminous Emulsion	Litre (l)
(ii) Asphalt Surfacing (30mm) (1) Continuously graded (Class A-E2 modified binder & 100mm maximum aggregate size)	Tonnage (t)
(g) Kerbing	m
(h) Remove and relay existing 60mm interlocking block paving	square metre (m^2)

The unit of measurement for subitem (a) shall be the cubic metre of roadbed material prepared and compacted as specified in subclause 3305(c). The quantity shall be computerized dimensions of the completed layer

The tendered rates shall include full compensation for shaping, scarifying, mixing of in situ imported material if required, and preparing and compacting the material as specified.

The unit of measurement for subitems (b) to (e(i)) shall be the cubic metre of compacted pavement layer, and the quantity shall be calculated from the authorized dimensions of the layer.where instructed by the engineer.

The tendered rates shall include full compensation for procuring, as if from soft excavation or pits, breaking down, placing, and compacting the material, including transporting the material for a distance of 1,0km, of up to 5% by volume of oversize material, and the protection and maintenance of the layer and the conducting of control tests, all as specified.

The unit of measurement for sub-subitems (e(ii)) shall be the ton of stabilizing agent. Measurement shall distinguish between the various stabilizing agents used. When mixtures of slag and cement or lime are used, the quantity of each constituent shall be measured separately and not the mixture as a whole. In the case of unslaked lime, the mass for purposes of payment shall be the mass of the lime before slaking, therefore the mass of the calcium oxide.

The tendered rate shall include full compensation for providing the stabilizing agent at the works, irrespective of the rate of application specified or ordered by the engineer but shall make allowance for the differences in mixing and compaction times specified for various stabilizing agents. The rate for ground granulated blast-furnace slag shall include full compensation for premixing the blast-furnace granulated slag with other stabilizing agents in the required portion, and the rate for unslaked lime shall also include full compensation for its slaking, including the supply and application of water.

The unit of measurement for sub-subitems (f(i)) shall be the litre of priming material measured at spraying temperature and sprayed as required.

The tendered rates shall include full compensation for supplying the priming material, cleaning and watering the layer to be primed, applying the priming material and maintaining the primed surface as specified.

The unit of measurement for sub-subitems (f(ii)) shall be the square metre of asphalt base constructed to the thickness specified. When specified in the project specifications and/or indicated in the schedule of quantities, the unit of measurement shall be the ton of asphalt constructed as specified and measured according to certified weighbridge tickets issued in respect of the mixture used. No payment will be made for material wasted.

The tendered rate shall include full compensation for procuring, furnishing, heating, mixing, placing, and compaction of all the materials as well as process control testing, protecting and maintaining the work as specified.

When the unit of measurement is a ton of asphalt, the tendered rate shall also include full compensation for supplying and installing a weighbridge, and for weighing the material

Item **Unit**

Add the following pay item

B22.29 Waterproofing of prefabricated culvert joints with a 500 mm wide composite membrane strip consisting of rubberized asphalt and cross-laminated high-density polyethylene film m

The unit of measurements is the metre of 300mm wide galvanised mild steel cover plate placed over joints as shown on drawings. The value shall include the provision of concrete nails at 300mm c/c to secure the steel plate in place.

The tendered rate shall include full compensation for procuring, furnishing, installing and placing the steel cover plate.

Item **Unit**

22/B61.03 Access and drainage

Add the following sub payment item:

(a) Access: Lump Sum

Add the following to the end of the first paragraph of item 61.03(a):

"The tendered lump sum shall also include full compensation for as many removals and reconstructions of the pioneer access roads as may be required to suit the plant used to excavate for and construct the foundation fill for the floor slab of the precast culvert."

Item ..... Unit

Add the following sub payment item:

22/B66.29 Galvanised high yield stress steel reinforcement bars:kilo gram (kg)

The unit of measurement shall be the kilogram weight of galvanised high yield steel bars installed on the canal floor slab to fix the Gabion Mattress to the apron slab.

The tendered rate shall include full compensation for supplying all the materials, including galvanising of the high yield steel bars, and for transporting, handling and storing, and for all labour, equipment and incidentals required for installing the galvanised mild steel sheet complete as detailed on the drawings.

SECTION B2300: CONCRETE KERBING, CONCRETE CHANNELLING, CHUTES AND DOWNPIPES AND CONCRETE LINING FOR OPEN DRAINS

B2301 SCOPE

Add the following to this clause:

"This section also covers the replacement of damaged concrete kerbing, channelling and lining."

B2304 CONSTRUCTION

b) Prefabricated concrete kerbing and channelling

Amend the end of the 2nd paragraph to read as follows:

"... road junctions, where the kerb units shall be 0,5 m in length for curve radii between 5,0 m and 20,0 m and 0,3 m in length for curve radii between 1,0 m and 5,0 m. For curves with a radius less than one metre the kerbs shall be cast in situ. Any associated prefabricated concrete channelling units shall also comply with the above requirements."

g) Concrete-lined open drains

Add the following to the last paragraph:

"Alternatively the surface could be sprayed with invert bituminous emulsion as soon as possible after the excavations have been trimmed and compacted. The sprayed surfaces shall be maintained until the concrete lining is cast. The nominal rate of application of the emulsion shall be 0.5 litre/m^2 unless otherwise instructed by the engineer."

Add the following sub-clause:

"**l) Demolition of existing kerb and channel and concrete lined drains**

Where shown on the drawings and/or indicated by the engineer, the existing kerb and channel and concrete lined drains shall be demolished to a specified maximum size, removed and transported to an approved spoil site as provided by the contractor..."

B2307 MEASUREMENT AND PAYMENT

Replace the description of items 23.07 with the following:

"Item		**Unit**
B23.07	**Trimming of excavations for concrete lined open drains:**	*cubic metre (m^2)*

In the second paragraph, commencing with "The tendered rates shall …." delete in the fifth, sixth and seventh lines the following words "including the removal of unsuitable ground and backfilling with suitable material."

Employer	Witness 1	Witness 2	Contractor	Witness 1	Witness 2

Add the following item as follows:

"**Item** **Unit**

B23.08 **Concrete lining for open drains:** *cubic metre (m^3)*

(a) Cast in situ concrete lining

(i) Class 30/20 concrete

(1) Trapezoidal Canal

The tendered rate shall include full compensation for procuring and furnishing all the materials, storing the materials, providing all plant, mixing, transporting, placing and compacting the concrete, forming the inserts, construction joints(except mandatory construction joints), and contraction/expansion joints, curing and protecting the concrete surfaces as specified. Payment shall distinguish between the different classes of concrete.

Add the following payment items:

Item **Unit**

B23.17 **Removal of unsuitable material and replacement with selected G7 quality material in excavations for concrete lined open drains and also alongside concrete drains** cubic metre (m^3)

The unit of measurement shall be the cubic metre of material in place after compaction. The quantity shall be calculated from the leading dimensions of the backfilling as specified or as authorized by the Engineer.

If excavations were carried out in excess of the dimensions authorized by the Engineer, the quantity of backfilling will nevertheless be based on the authorized dimensions.

The tendered rates shall include full compensation for the excavation and removal of the unsuitable material including a free haul distance of 1,0 km and replaced with selected G7 quality material including full compensation for the supply and compaction of the material from approved sources including a free haul of 1 km.

"Item ..... **Unit**

Add the following sub payment item:

23/B66.27 Drainage strips 300 mm wide (Kaytech WickDrain GPA 330 or equivalent as approved by the engineer), including wrapping the strips in stitched grade 2 filter fabric sleeves metre (m)

The unit of measurement shall be the linear metre of drainage strips installed on the earth faces of the precast box culvert walls and wing walls.

The tendered rate shall include full compensation for procuring and furnishing all the materials, transporting, handling and storing, and for all labour, equipment and incidentals required for installing the drainage strips wrapped in stitched grade 2 filter fabric sleeves, complete as detailed on the drawings, including attachment to the precast culvert barrel and earwing walls.

Item ..... **Unit**

Add the following sub payment item:

23/B66.28 Perforated drainage pipes (Kaytech M65 geopipe or equivalent as approved by the engineer), including wrapping the pipes in grade 2 filter fabric and constructing the 200 mm x 100 mm concrete bedding strips (class 15/19) .....
metre (m)

The unit of measurement shall be the linear metre of perforated drainage pipe installed on the earth faces of the precast box culvert barrel and wing walls.

The tendered rate shall include full compensation for procuring and furnishing all the materials, transporting, handling and storing, and for all labour, equipment and incidentals required for installing the drainage pipes wrapped in grade 2 filter fabric complete as detailed on the drawings, including for the construction of the 200 mm x 100 mm concrete bedding strip (class 15/19) below the pipes.

COLTO SERIES 3000: EARTHWORKS AND PAVEMENT LAYERS OF GRAVEL OR CRUSHED STONE

SECTION B3100: BORROW MATERIALS

B3103 OBTAINING BORROW MATERIALS

Add the following paragraph:

“The contractor shall adhere to the requirements within the environmental management plan for the preparation of the area to be utilised as a borrow pit. This shall include the removal and storage of the topsoil within the affected area, maintenance of the area during use and the rehabilitation of the area to its natural state on completion. A photographic record shall be kept of all borrow pit areas. Any construction material spoiled within these sites shall be buried to a depth of no less than 300mm below the surface soil. No construction material of any nature shall be left visible after topsoiling. The engineer shall confirm this before grassing commences. The area shall be kept free of all undesirable plant material.”

a) General

Add the following:

"The acquisition and compensation for land from which borrow material is obtained shall be negotiated and paid for by the employer."

c) Use of borrow materials

Delete the last sentence of the second paragraph and replace with the following:

"Compensation to owners and arrangements with owners for taking material from alternative borrow pits proposed by the contractor shall be the contractor's responsibility and entirely at his own expense and risk. Such borrow pits may be accepted by the engineer only if the material complies in all respects with the specifications, it is the best economic alternative and the contractor can provide proof of compliance with all relevant legislation."

Add the following new paragraphs to the end of this sub-clause:

"The engineer shall instruct the contractor as to the applicable usage of borrow pits always employing the best economic alternative (lowest cost in terms of tendered rates) taking cognizance of the following:

- Quality of material;
- Haulage distance;
- Hardness of material;
- Overburden.

Under no circumstances shall the contractor be entitled to any additional compensation in respect of any instruction by the engineer as to the usage of borrow pit material.”

SECTION B3200: SELECTION, STOCKPILING AND BREAKING DOWN THE MATERIALS FROM BORROW PITS, CUTTINGS AND EXISTING PAVEMENT LAYERS AND PLACING AND COMPACTING THE GRAVEL LAYERS

B3203 STOCKPILING THE MATERIAL

In the first paragraph, in the first sentence insert the following before "borrow pits":

"commercial sources, existing pavement layers, ..."

In the third paragraph, replace the second and third sentences with:

"Before any stockpiling may be done the area shall be cleared of topsoil to a sufficient depth that will subsequently allow for the complete rehabilitation of the site with a cover of topsoil that does not exceed 100mm in depth and is not less than 75mm in depth. If there is insufficient topsoil; the contractor shall acquire whatever balance is needed to rehabilitate the area at his own cost. No make-up topsoil shall be taken from the road reserve. The topsoil shall be stored in an area that shall not be affected by construction activities nor impede the natural flow of water. The topsoil so windrowed or stockpiled and its surrounds shall be kept free of all undesirable vegetation. The contractor shall not commence his stockpiling activities without prior written approval from the engineer that the site has been adequately prepared.

Stockpile sites shall be graded smooth with an adequate slope to ensure proper drainage. The surface shall be watered and compacted to a depth of at least 150 mm and to a density of 90% of modified AASHTO density. The compacted surface shall be firm. Upon completion, the surface shall be swept clean.

Stockpile sites shall be large enough to allow the different types of material to be stockpiled without overlapping or exceeding the limits of the prepared site. Enlargement of the stockpile sites after the stockpiles have been placed will not be permitted without the engineer's approval.

After the stockpiled material has been removed, the site shall be reinstated as closely as possible to its original condition by ripping of the affected areas, re-landscaping if necessary, re-instatement of the topsoil and re-vegetation."

B3204 BREAKING DOWN THE MATERIAL

(b) Further breaking-down of pavement material

Add the following at the end of the 1st paragraph:

"This shall apply mutates mutandis for in situ recycling of pavement layers."

B3208 PLACING AND COMPACTING THE MATERIALS IN LAYER THICKNESSES 0F 200mm AND LESS AFTER COMPACTION

Add the following before the 1st paragraph:

"In the case of in situ reconstruction of existing pavement layers, the contents of this

clause shall apply regardless of the layer thickness after compaction."

(c) In place reworking of pavement layers

Add the following paragraphs:

"Where the new layer is to be constructed by in situ recycling one or more existing pavement layers, with or without the addition of extra material, the preparation procedures of subclause B3403 and B3512 shall apply so as to achieve a uniform pulverised layer complying with the target grading as specified in Table 3402/7.

The recycled layer shall not contain more than 40% of recycled asphalt or bituminous layers (RAP) measured as after compaction thickness of the designed layer.

New layers thicker than 200mm constructed using the above processes may be permitted by the engineer if the contractor can provide sufficient proof that his recycler has the capability to provide a homogenous layer with respect to moisture, stabiliser content and compaction."

Add the following new sub-clause:

d) Construction joints in new layers

Where construction joints are formed between adjacent portions of the same layer the following conditions shall apply:

(i) Joints shall be either at right angles or parallel to the road centreline.

(ii) Joints in successive layers shall not correspond with those of the layers below and shall be offset at a minimum of 150mm or as indicated on the drawings.

(iii) The need for and positions of all proposed joints shall be approved by the engineer prior to the commencement of work.

(iv) During the creation of a joint in a layer, the existing material or the material previously placed for the specific layer shall either be cut back sufficiently (minimum 150mm) to ensure the incorporation of any loose or disturbed material, or ripped (minimum 150mm) and compacted together with the new portion of the layer to be constructed or only re-compacted together with the new portion of the layer as may be required by the engineer to ensure that a sound fully compacted joint is formed."

B3209 PLACING AND COMPACTING THE MATERIALS IN LAYER THICKNESS IN EXCESS OF 200 mm AFTER COMPACTION (only applicable in the case of fills)

Add the following before the 1st paragraph:

(c) Rock fill

"Rock-fill processing and compaction shall apply to material consisting predominantly of stone and boulders, with some fine material in between, which, on account of the mechanical interlock of the rock, cannot be effectively compacted by construction methods normally used for soils and gravel.

“When the layer thickness after compaction is 500m or less as instructed by the engineer, the processing and compaction of such material shall not be classified as rock-fill processing and compaction, and the engineer may prescribe that the material be compacted as described subclause (b)”.

“The maximum size of rock which may be used in rock fill is 750 mm, and the layer thickness before compaction shall not be in excess of one and a half times the average actual size of the rock. The engineer may prescribe that 5% of the oversize material shall be bladed off the road after the material has been dumped onto the road, and it shall be disposed of as described in clause 3210, so that the layer thickness will not be determined by the presence of isolated large rock fragments.

The compacted layer shall not contain any rock fragments the largest dimension of which exceeds the thickness of the compacted layer.”

SECTION B3300: MASS EARTHWORKS

B3302 MATERIALS

b) Fill

Add the following under item (iv):

"The maximum swell at 100% Mod AASHTO compaction shall not be more than 2%."

B3303 CLASSIFICATION OF CUT AND BORROW EXCAVATION

Classification of cut and borrow excavation shall be revised as follows:

"**a) Classes of excavation**

(ii) Intermediate excavation

No distinction shall be made between soft and intermediate excavation, and all intermediate excavation shall be classified and measured as soft excavation."

B3305 TREATING THE ROADBED

a) Removing unsuitable material

Replace "or" in the eight line of the third paragraph with "and"

d) In situ treatment of roadbed

Add the following after the second paragraph:

"Shales and mudstone shall be treated as directed by the engineer."

B3306 CUT AND BORROW

e) The temporary stockpiling of materials

Replace the contents of this subclause with the following:

"The contractor shall plan his activities in such a manner so that materials excavated from borrow areas and cuttings can be directly transported to and placed at the designated points.

The temporary stockpiling of material will not be paid for separately unless instructed by the engineer, and full compensation will be deemed to have been included in the rates tendered for the various payment items for work for which the stockpiled material is to be used."

g) General

Add the following after the first sentence of the second paragraph:

"The final cut surface in hard excavation shall not be more than 0,5 m below the specified slope face, measured at right angles to the strike and dip directions of the slope face."

B3307 FILLS

a) General

Add the following:

"Where existing embankments are to be widened, or where new embankments are to be constructed adjacent to existing embankments, the existing side slopes shall be benched as specified in subclause 3307(d) and in accordance with the details on the drawings.
In addition the material in the fill widening shall, unless otherwise instructed by the engineer, be compacted as follows:

(i) where the thickness exceeds 1,5 m, it shall be compacted to a minimum of 93% modified AASHTO density to a depth of at least 1,5 m below the final road level; or

(ii) where the thickness is less than 1,5 m, the in situ roadbed and fill material shall be compacted to 93% modified AASHTO density."

d) Benching

Replace the first sentence of the second paragraph with the following:

"The dimensions of benches as well as the extent to which existing fills have to be cut back to form benches shall be as indicated on the drawings or indicated by the engineer."

Add the following after the second paragraph:

"In order to obtain sufficient working width for road-building equipment when the existing road fill is widened, it may be necessary to form benches that extend beyond the normal road prism or to cut back into the existing road fill or both. The contractor shall submit his proposals in this regard to the engineer for approval before proceeding with such work. The contractor will be paid in accordance with the relevant payment items for work required to obtain a working width of up to 4 m. Additional work required to provide a working width in excess of 4 m shall be at the contractor's expense."

B3312 MEASUREMENT AND PAYMENT

Add the following items:

"Item		**Unit**
B33.21	**Fill constructed with material obtained from commercial sources or sources provided by the contractor, including all haul**	
	(a) Gravel material in compacted layer thicknesses of 150 mm and	

less:

(i) Compacted to 90% of Maximum Dry Density m^3

The unit of measurement is the cubic metre of material measured in the compacted fill. The quantity measured shall be calculated by the method of average end areas from levelled cross-sections prepared from the ground line after clearing and grubbing and the removal of topsoil and the completion of any preparatory roadbed treatment which may have been ordered by the engineer, but prior to the construction of the fill, and the final specified or authorised fill cross-section superimposed at 20 m intervals along the centre line of the road. All measurement shall be neat and no payment will be made for that part of the fill placed in excess of the authorised cross-section shown on the drawings or instructed by the engineer, irrespective of the tolerances in workmanship allowed under the contract. Where the roadbed has subsided under the fills, the quantities shall be adjusted to make allowance for such subsidence, as set out in the note at the beginning of clause 3312. Measurement of fill shall distinguish between the alternative methods of processing and compacting.

Where measurement by cross-sections is considered by the engineer to be impractical, the compacted volume of the material may be taken as equal to 70% of the loose volume of material in the hauling vehicles as an alternative method of measurement.

The tendered rates shall include full compensation for the costs of negotiations and payment of royalties, for procuring, furnishing and transporting the materials over an unlimited free-haul distance from the sources to the site, for placing, preparing, processing, shaping, watering, mixing and compacting the materials to the densities or in the manner specified, and for removing and disposing of all oversize material from the road after processing, including transport for the haul distance to approved dumping sites provided by the contractor.

Payment shall distinguish between the various methods of processing and compacting specified, as itemised above."

B33.22 Fill constructed with material from commercial sources.

(c) Rock fill (as specified in subclause 3209(c)) m^3

(d') Toe for Rock fill embarkments as specified in subclause 3307(h) m^3

Rock-fill processing and compaction shall apply to material consisting predominantly of stone and boulders, with some fine material in between, which, on account of the mechanical interlock of the rock, cannot be effectively compacted by construction methods normally used for soils and gravel.

The maximum size of rock which may be used in rock fill is 750 mm, and the layer thickness before compaction shall not be in excess of one and a half times the average actual size of the rock. The engineer may prescribe that 5% of the oversize material shall be bladed off the road after the material has been dumped onto the road, and it shall be disposed of as described in clause 3210, so that the layer thickness will not be determined by the presence of isolated large rock fragments.

The compacted layer shall not contain any rock fragments the largest dimension of which exceeds the thickness of the compacted layer.

Where required. rock fill embankments shall be protected by special toes. which shall be installed as shown on the drawings and as directed by the engineer.
The toe shall be constructed simultaneously with the rest of the fill and shall consist of selected rock material varying in size between 150 mm and 750 mm. If shown on the drawings, a layer of synthetic-fibre filter material and a sand blanket shall be installed at the interface between the normal fill and the rock protection. Care shall be taken not to damage or tear such material. The toe shall be constructed and compacted as described in clause 3209 for rock fill, but the following additional requirements shall be taken into consideration: The outer part of the toe shall consist of larger boulders properly bedded by means of smaller fragments so as to form a stable interlocking surface. If placing with mechanical construction equipment does not achieve the required results, the equipment shall be supplemented by manual labour to select. bar and place keystones in between the larger boulders until the correct placing is achieved and the rocks are firmly interlocked.

No additional payment will be made for the supply and installation of synthetic-fibre filter material and sand blankets.

SECTION B3400: PAVEMENT LAYERS OF GRAVEL MATERIAL

B3402 MATERIALS

a) General

Add the following at the end of the second paragraph:

"For chemically stabilised layers the material shall conform to the requirements in table B3402/5.

For bitumen stabilised layers the material shall conform to the requirements in table B3402/6.

For cold in situ recycled layers the target grading shall be as indicated in table B3402/7"

Add the following after the second paragraph:

"Distinction shall be made between crushed and natural G4, G5 and G6 materials. Where the crushing and/or screening of these materials has been specified, the combined grading shall conform to the grading limits specified for G4 class material in Table B3402/1.

The same shall apply for all materials obtained from commercial sources."

Replace the grading and grading modulus sections in Table 3402/1 with:

GRADING	Nominal aperture size of sieve (mm)	Percentage passing through sieve by mass		The percentage by mass passing the 2,00mm sieve shall not be less than 20% nor more than 70%	None specified
		Crushed material produced by multi-stage crushing and screening	Uncrushed material or material produced by single stage crushing		
	53		None specified		
	50	100			
	37,5	100			
	28				
	20	61 – 91			
	14	48 - 82			
	5	31 - 66			
	2	20 - 50			
	0,425	10 - 30			
	0,075	5 - 15			
GRADING MODULUS (GM)		-	2,4 ≥ GM ≥ 1.,5	2,4 ≥ GM ≥ 1,5	2,6 ≥ GM ≥ 1,2

Note:
Refer to standard COLTO table for COLTO grading if required

Replace Table 3402/5 with:

"TABLE B3402/5: REQUIREMENTS FOR CHEMICALLY STABILISED LAYERS

Classification	C1	C2	C3	C4
Material before treatment	At least G2 quality	At least G4 quality	At least G5 quality	At least G6 quality
PI after treatment	Non-plastic	Non-plastic	6 max. *(1)	6 max. *(1)
UCS (MPa) *(2)	6 min.	4 min.	1,5 min	0,75 min.
ITS (kPa) *(3)	-	-	250 min.	200 min.
WDD (% loss) *(4)	5 max.	10 max.	20 max.	30 max.

Note:
* (1) For materials derived from the basic crystalline rock group, the Plasticity Index after stabilisation shall be non-plastic.
* (2) Unconfined Compressive Strength @ 100% Mod. AASHTO density
* (3) Indirect tensile Strength @ 100% Mod. AASHTO density (Rapid Curing)
* (4) Wet/Dry Durability according to Method B 8110"

b) Compaction requirements

Amend the compaction requirements as follows

"Lower selected layer: 93% of MDD
Upper selected layer: 95% of MDD
Subbase: 100% of MDD
Base: 88% of MDD
Shoulder & wearing course:"

B3405 CONSTRUCTION TOLERANCES

(a) Level

Replace the table in the sub-sub-clause with the following:

"	H_{90}	H_{max}
Selected layers	*25 mm*	*33 mm*
Sub-base layers	*15 mm*	*20 mm*
Base layers	*12 mm*	*15 mm*
Shoulders		*25 mm"*

Add the following:

"Level control for the various pavement layers shall be done at least at the following intervals in the longitudinal direction:

Layer	Interval
Selected layer, sub-base, shoulders and wearing course	20 m
Base	10 m

(b) Layer thicknesses

Replace the table in the sub-sub-clause with the following:

"	D_{90}	D_{max}	D_{ave}
Selected layers	*25 mm*	*35 mm*	*8 mm*
Sub-base layers	*18 mm*	*24 mm*	*5 mm*
Base layers	*15 mm*	*22 mm*	*5 mm*
Shoulders		*30 mm*	*0 mm"*

B3406 QUALITY OF MATERIALS AND WORKMANSHIP

Replace the second paragraph with the following:

"Test results and measurements will be assessed in accordance with the provisions of Section 8200."

3407 MEASUREMENT AND PAYMENT

Amend the following payitem as follows:

Item		**Unit**
B34.01	**Pavement layers constructed from gravel taken from commercial sources, including haulage**	
	(c) Gravel subbase using G5 material (unstabilized gravel) compacted to:	
	(i) 100% of Maximum Dry Density (MDD) (150mm layer thickness)	m^3

The unit of measurement shall be the cubic metre of compacted pavement layer, and the quantity shall be calculated from the authorized dimensions of the completed layer. The tendered rates shall include full compensation for procuring, as if from soft excavation or pits, breaking down, placing and compacting the material, including unlimited haulage and its removal, disposal and transporting for an unlimited distance of up to 5% by volume of oversize material, and the protection and maintenance of the layer and the conducting of control tests, all as specified.

SECTION B3500: STABILIZATION

B3501 SCOPE

Add the following as a 3rd paragraph:

“The use of recyclers for cold in situ recycling purposes is also covered in this section, which includes cement, lime, emulsion and foam stabilisation of base and subbase layers consisting of gravel and/or crushed stone material as described in sections 3400 and 3600.”

B3502 MATERIALS

a) Chemical stabilizing agents

Delete sub-clauses (ii) Ordinary Portland cement *and* (iii) Portland blast-furnace cement *and replace with the following*:

"Cement shall comply with the relevant requirements of SANS 50197-1:2000. The use of strength classes greater than 32,5 shall not be permitted.

On this contract CEM II shall be used for stabilization purposes.”

B3503 CHEMICAL STABILIZATION

a) Preparing the layer

Insert the following before the first paragraph:

“Moisture content tests shall not be undertaken more than one day in advance of in situ stabilization operations. Care shall be taken to ensure that samples are representative of the in-situ material. Checks shall be conducted when wet weather occurs between initial testing and work commencing on any section.”

b) Applying the stabilizing agent

Replace the second sentence of the second paragraph with the following:

“Spreading shall only commence when the engineer is satisfied that the correct quantity of stabilizing agent has been placed on the layer and has given permission that the stabilizing agent may be spread uniformly over the entire surface to be treated."

h) Curing the stabilized work

Add the following to method (ii):

"The covering material shall be placed by end-tipping, spread, and not compacted until the underlaying layer has cured for at least 7 days."

Add the following to paragraph:

"Method (iii) and (iv) shall not be applicable."

i) Construction limitations

Replace the fourth paragraph starting with "No stabilization ..." *with the following:*

"No stabilization shall be done during windy conditions, wet weather or with falling air temperatures (7°C and dropping), or during rising air temperatures (when the air temperature is below 3°C).

The surface temperature of a compacted stabilized layer shall not be allowed to fall below 1°C during the first three (3) days after stabilization. The contractor shall be responsible for taking the necessary precautions to prevent the layer from freezing.

All stabilized layers damaged by rain, frost or by the formation of ice in the layer shall be removed and replaced by the contractor at his own expense.

The contractor shall make allowance for these requirements in his construction programme."

In Table 3503/1, delete "8 hours" for Ordinary portland cements and cement blends *and replace with* "6 hours".

B3506 TOLERANCES

b) Uniformity of mix (chemical stabilisation)

Replace the full stop at the end of paragraph (i) with the following:

"using the formula $(\underline{S_n} / X_n)$

where:

S_n is the standard deviation of stabilizer
X_n is the average stabilizer content."

B3507 CONSTRUCTION OF TRIAL SECTION

Insert the following before the second paragraph:

"Prior to carrying out the trial section for cold in situ recycling, the contractor shall assemble all items of plant and equipment that he proposes to use for the recycling operation. Only those machines he intends using for production work shall be used to construct the trial section and under no circumstances shall he be permitted to use any substitutes. The first section of pavement to be recycled shall be regarded as a trial section with the objective of:

- demonstrating that the equipment and processes he proposes to employ are capable of constructing the recycled layer in accordance with the specified requirements;

- determining the effect on the grading of the recycled material by varying the forward speed of the recycling machine and the rate of rotation of the milling drum; and
- determining the amount of rolling necessary to achieve the compaction requirements.

The trial section shall be at least 200m in length and shall cover the full lane-width or half-road width in accordance with the geometry of the road and the accepted work plan.

To allow the engineer sufficient time to assess all aspects of quality of the completed trial section and contingent on the results being satisfactory, the contractor shall programme to start production recycling work no sooner than one week after constructing the trial section.

Should the contractor make any alterations in the methods, processes, equipment or materials used, or if he is unable to comply consistently with the specifications due to variations in the in situ material, or for any other reason, he may be required to undertake further trial sections before continuing with the permanent work."

Insert the following new paragraph after the third paragraph:

"For cold in situ recycling provision is made for payment for the first approved trial section. Such payment will be made as an extra-over to the various payment items for recycling work together with all additives that will be measured and paid as normal production work. Any further trial sections ordered by the engineer shall likewise be paid provided they are approved."

B3510 MEASUREMENT AND PAYMENT

Item **Unit**

B35.02 Chemical stabilizing agent

Replace the full stop at the end of the third paragraph with the following:

" and layer dimensions."

Add the following new payment items:

"**Item** **Unit**

B35.13 Extra over item for B35.01 the construction of a trial section cubic metre

The tendered rate shall include full compensation for all costs to make available, operate and to transport the recycling machine and other equipment to the sampling position. To provide the required traffic accommodation in terms of section B1500. The tendered rate shall further include full compensation for breaking up the pavement for sampling and temporary patching the disturbed road way by adding make-up material, watering, compacting and surfacing with a cold asphalt material. The tendered rate shall also include full compensation for all transport, labour and other incidentals required for the construction of the trial section."

SECTION B3600: CRUSHED-STONE BASE

B3602 MATERIALS

a) Requirements for crushed aggregate

After the first sentence delete the remainder of the paragraph and replace with the following:

"The aggregate shall not contain more than 0,1% by mass of unwanted material such as wood, coal or similar organic material.

Aggregates containing mica, such as granite, gneiss, mica schist, pegmatite, sandstone shall not contain more than 2% by mass of free mica, especially muscovite, when assessed by visually separating the particles, or more than 4% by volume when assessed by means of microscopic slides. Aggregate containing easily detectable quantities (more than 1%) of olivine, serpentine and sulphide minerals such as pyrites and marcasite, must be considered with caution, and may warrant additional evaluation to the satisfaction of the engineer. Argillaceous rocks may only be used if specified in the project specifications, or with the engineer's written approval.

Soft or weathered particles shall be controlled by the Durability Mill Index values specified in B3602(e) Durability.

Provision has been made in clause B8108(b)(iii), calculation, for the determination and calculation of the Apparent Density for aggregates with a total water absorption greater than 1,5%, when total water absorption is determined according to SANS 3001-AG20 (replacing TMH1 method B14) and SANS 3001-AG21 (replacing TMH1 method B15)."

c) Grading requirements

Replace entire clause with the following:

"The target grading, after compaction, shall be as near as possible to the mean of the specified grading envelope listed in table B3602/1 and shall be continuous with no marked gaps or excessive quantities of any particular size. The mean grading of each lot (minimum of 4 but preferably 6 test points per lot) shall conform to the approved target grading plus or minus the tolerances specified in table B3602/4. However, no target grading plus tolerance can be set outside the original grading envelope in table B3602/1."

Table 3602/1

In table 3602/1 delete "85% of bulk relative density" *and replace with*:

"88% of Apparent Relative Density".

Replace the grading section in Table 3602/1 with:

Grading	Nominal aperture size of sieve (mm)	Percentage passing through sieve by mass			
		Nominal max size			
		G1	G2	G3	
		37.5mm	37.5mm	37,5 mm	28 mm
	37,5	100	100	100	
	28	86 - 95	86 - 95	86 - 95	
	20	73 - 86	73 - 86	73 - 86	87 - 96
	14	61 - 76	61 - 76	61 - 76	73 – 86
	5	37 - 54	37 - 54	37 - 54	43 - 61
	2	23 – 40	23 – 40	23 – 40	27 – 45
	0,425	11 – 24	11 – 24	11 – 24	13 – 27
	0,075	6 - 10	6 - 10	6 - 10	5 - 12

Note:
Refer to standard COLTO table for COLTO grading if required

Replace Table 3602/4 with:

TABLE B3602/4

Sieve size (mm)	Permissible deviations by mean values (% by mass)		Permissible deviations by individual values (% by mass)	
	Nominal maximum size (mm)			
	37,5	28	37,5	28
28	± 5		± 5	
20	± 5	± 5	± 7	± 7
14	± 5	± 5	± 7	± 7
5	± 5	± 5	± 7	± 7
2	± 4	± 4	± 5	± 5
0,425	± 3	± 3	± 5	± 5
0,075	± 2	± 2	± 3	± 3

Note:
Refer to standard COLTO table for COLTO grading if required

Add the following sub-clause:

"**e) Durability**

The durability property of aggregates derived from the basic crystalline group shall be assessed by means of the Ethylene Glycol Durability Index. When tested in accordance with the method prescribed in B 8105(g) the Durability Index shall not exceed four. In addition, the 10% FACT value obtained after soaking in ethylene glycol for four days shall not be less than 50% of that obtained on the unsoaked sample. Where any values are obtained that fall outside the above requirements, a detailed assessment of the quarry shall be undertaken together with a specialist mineralogical evaluation of both the coarse as well as fine fractions in order to assess the long-term durability properties of the material.

For Basic crystalline rocks, Arenaceous rocks, Argillaceous rocks and Diamictites the Durability Mill Index (DMI) shall be less than 125. For all other rock types the Durability Mill Index (DMI) shall not be more than 420, subject to the % passing the

0,425mm sieve not increasing by more than 8 percentage points during the Durability Mill test."

B3604 CONSTRUCTION

b) Compaction

Replace that last sentence of the first paragraph with:

"The density of the layer shall be tested at each third of the layer thickness."

c) Surfacing preparation of the base

Replace the final paragraph in subsubclause 3604(c)(i) with:

"Slushing of the base, is compulsory and shall be carried out within 48 hours after completion of the compaction. Even if the specified density is achieved without slushing or before completion of the slushing process, the full slushing process must still be completed."

Delete sub-sub-clause (ii) Multi-stage process (water or slurry rolling).

B3605 PROTECTION AND MAINTENANCE

Replace "moisture content of the layer" *in the first paragraph with* "moisture content of the upper 50mm of the layer."

Add the following to the end of the second sentence:

"as determined according to SANS 3001-GR30 (replacing TMH 1 method A7)."

B3607 QUALITY AND WORKMANSHIP

Delete "or 8300" *in the second paragraph*.

B3608 MEASUREMENT AND PAYMENT

Delete the first paragraph and replace it with the following:

"Note: No additional or extra over payment shall be made for work in restricted or confined areas."

"Item **Unit**

B36.01 Crushed-stone base

Add the following subitem:

c. Constructed from type G5 material obtained from commercial sources, and compacted to 100% of MDD
(150mm thickness 37mm nominal maximum stone size) cubic metre (m3)"

B36.03 Crushed-stone base trial section (thickness indicated) constructed in

accordance with the provisions of clause 3603

Add the following after the last sentence:

"If the trial section is constructed at the final base level and it is approved by the Engineer, then this rate shall cover all the costs for the section of base and no further payment will be made under item 36.01.".

B36.16 Finishing off base layer by slushing using water

The tendered rate shall also include full compensation for all transport, labour and other incidentals required for the construction of the trial section."

COLTO SERIES 4000: ASPHALT PAVEMENTS AND SEALS

SECTION B4100: PRIME COAT

B4102 MATERIALS

b) Aggregate for blinding

Add the following sentence:

"Blinding of the primed surface with aggregate shall only be permitted to facilitate vehicular access to adjoining properties"

B4104 WEATHER AND OTHER LIMITATIONS

Replace paragraph (g) with the following:

"(g) When at any position within the layer the moisture content of a granular base layer is more than 50% of the optimum moisture content determined according to SANS 3001-GR30 (replacing TMH 1, Method A7). In the event of rain after priming, the base shall be allowed to dry out to meet the above moisture content requirement prior to surfacing."

B4106 APPLICATION OF THE PRIME COAT

Replace paragraph (c) with the following:

"The type of prime and application rate best suited for the base shall be determined during construction. The Contractor shall provide about 20ℓ of each prime and apply it at different application rates with a brush on the base. Then engineer will then instruct the type of prime and application rate to be used. No payment shall be made for tests to determine the type of prime.

Unless directed otherwise by the engineer or indicated on the drawings, the edges of the primed surface shall be 150mm wider than the edges of the surfacing. "

Add the following sub-clause:

"(j) Application in areas treated by reworking and construction of a new base shall be primed using a mechanical distributor complying with sub-clause 4103(a). The edges of the previously constructed or existing surfacing shall be adequately protected by approved means to ensure that an overlap of prime not exceeding 50mm is sprayed onto the previously constructed or existing surfacing."

B4108 TOLERANCES

Replace the first paragraph with the following:

"The actual spray rates measured at spraying temperature shall not deviate by more than 8.0% from that ordered by the engineer. The engineer may, at his discretion, conditionally accept application rates falling outside this tolerance at reduced payment in accordance with Table B4108/1.

TABLE B4108/1:PAYMENT REDUCTION FACTORS FOR CONDITIONALLY ACCEPTED PRIME COAT

Deviation specified spray rate at spraying temperature. (%)	Payment reduction factor of tendered rate.
±8,0	1.00
±9,0	0.97
±10,0	0.95
±11,0	0.90
±12,0	0.85
±13,0	0.80

Any deviation outside these limits shall not be paid for, however, the engineer shall have the right to instruct the contractor to make up any deficiency, or blind excessive prime without additional payment. Where so instructed, the material for blinding shall consist of approved, but shall consist of screened 5mm nominal single size aggregate. The use of crusher dust for blinding shall not be permitted. If under-spraying occurs, and it is accepted by the engineer, only the actual quantities applied shall be paid for."

B4109 TESTING

Add the following:

"No payment will be made if this condition is not adhered to. The contractor shall provide, at his cost, representative samples of every batch of prime delivered onto site."

SECTION B4200: ASPHALT BASE AND SURFACING

B4202 MATERIALS

a) Bituminous binders

(i) Conventional binders

Add the following:

"The binders to be used shall be as follows:

(a) Continuously graded surfacing course: 50/70 penetration grade bitumen
(b) Continuously graded base: 30/50 penetration grade bitumen".

(iii) Homogeneous modified binders

Replace the last sentence with:

"The modified binder to be used on this project shall be A-E2

The homogeneous modified binder shall be manufactured according to the guidelines contained in "Technical Guideline: The use of Modified Bituminous Binders in Road Construction (TG 1-2015): Asphalt Academy". The base bitumen shall conform to SANS 4001-BT1:2012, or a blend of SANS 4001-BT1:2012 grades. The type as well as percentage of modifier is not prescribed, however the contractor shall indicate in the Pricing Schedule what polymer he shall be using. The properties of the homogeneous modified binder shall comply with the relevant requirements for binder class A-E1/A-E2/ A-P1* as listed in table B4202/12 and A-H1/A-H2* as listed in table B4202/13.

TABLE B4202/12: PROPERTIES OF POLYMER-MODIFIED BINDER FOR HOT-MIX ASPHALT

		Test Method	**Class**
Before ageing			**A-E2**
Softening point [2]	°C	MB-17	65-85
Elastic recovery @ 15°C	%	MB-4	> 60
Dynamic viscosity @ 165°C	Pa.s	MB–18	≤0,6
Storage stability @ 180°C [1]	°C	MB-6	≤ 5
Flash point	°C	ASTM D92	≥ 230
After ageing (RTFOT)			
Mass change	%	MB-3	≤ 1,0
Softening point (min)	°C	MB–17	63
Elastic recovery @ 15°C	%	MB-4	> 50

[1] *Certain base bitumens, when used in the production of modified binders, are prone to cause segregation of the modified binder. The Storage Stability test result should be interpreted as an indicator of the compatibility of the base bitumen and the modifier used. In cases where compliance limits are not met, proposals of site agitation procedures of the binder to prevent segregation shall be submitted to the client for consideration. In all cases, whenever there is any reason to believe that the composition of the base bitumen has changed, the test shall be repeated to ensure*

compliance or to determine the need for measures to prevent segregation.

[2] *The prescribed test method is based on not using stirrers although it has been reported that the use of stirrers has shown no difference in test results. For referencing purposes no stirrers should be used.*

TABLE B4202/15: TEMPERATURE/TIME LIMITS FOR POLYMER MODIFIED BINDERS

Binder Class	Short Term Handling/ Transportation		Storage [1]		Spraying/Asphalt Mixing/Application		
	Max Temp (°C)	Max Holding Time (hrs)	Max Temp (°C)	Max Holding Time [2] (hrs)	Max Temp (°C)	Min Temp (°C)	Max Holding Time (hrs)
A-E2 [3]	180	24	160	240	180	170	12

[1] *When storing product for 48 – 240 hours, it is recommended that the tank has agitation circulation.*

[2] *If the recommended maximum holding time has been exceeded, the binder should be resampled and tested to ensure compliance with the specification.*

[3] *A-E2 temperature to be confirmed by practitioners and historical data.*

b) Aggregates

Add the following paragraph to the introductory description:

"Asphalt mixes shall be manufactures using different individual single size coarse aggregates fractions and crushed fine aggregates blended to conform to the specified grading requirements. The use of natural sands shall only be permitted if approved by the engineer and shall be limited to a maximum of 5% for continuously graded mixes. All aggregate in excess of 5mm shall consist of individual nominal single sized aggregate. For stone mastic asphalt mixes all aggregate fractions in excess of 2mm shall consist of individual single size fractions. The Contractor shall note that commercial suppliers may not be able to supply all the required single size aggregates, in which instance arrangements will have to be made for additional on site screening. No additional payment shall be made for screening aggregate. The use of run of crusher type materials shall not be permitted."

(v) Absorption

Add the following sentence:

"In addition, the total binder absorption of the combined coarse and fine aggregate blend shall not exceed 0,5%"

(viii) Grading

Delete the second paragraph commencing with "The target grading…" *and add the following paragraphs **

The grading limits for the combined aggregate grading for the asphalt surfacing shall be as specified in table 4202/7: Continuously graded medium grade.

The grading limits for the combined aggregate grading for the stone mastic asphalt shall be as specified in table B4202/10. In addition to the specified grading limits, the percentage by mass of aggregate smaller than 0,005mm, when determined in accordance with SANS 3001: Method GR3, shall be less than 1,0 of the combined aggregates excluding the active filler added in the approved mix. The engineer may request a reconsideration of blends to achieve any grading within the relevant

envelope in order to improve certain mix properties.

(x) Rolled-in chippings

Replace Table 4202/11 with:

TABLE B4202/11: GRADING LIMITS FOR ROLLED-IN CHIPPINGS

Sieve size (mm)	Chip size - Percentage passing by mass	
	20 mm	**14 mm**
20,0	100	
14,0	0 – 20	100
10,0	0 – 5	0 – 20
7	0 – 1	0 – 5
0,425	0,5 max	0,5 max

Note:
Refer to standard COLTO table for COLTO grading if required

Add the following new sub-item:

"(xi) Moisture content

The moisture content of aggregates, sampled from the cold feed belt, shall not exceed the following limits at the time that it is introduced into the mix:

- Coarse aggregate 2%
- Fine aggregate..... 4%"

c) Fillers

Delete the second last sentence of the first paragraph and replace with:

"With the exception of stone mastic asphalt, in no instance shall more than 2% by mass of active filler be used in the mixes."

Add the following after the last paragraph:

"For tender purposes the active filler shall be hydrated lime"

f) Asphalt for hot plant mix recycling

Add the following:

"Reclaimed asphalt (RA) shall be asphalt that has been recovered using a milling machine or by crushing slabs ripped up from asphalt pavements, lumps from slabs, or asphalt from reject and surplus production. RA shall be free of foreign material such as unbound granular base, broken concrete, remnants of geosynthetic grids or cloths, or other contaminants. The minimum percentage of Reclaimed Asphalt (RA) that is to be added to the mix shall be 40%."

h) General

Add the following after the second paragraph:

"Sufficient aggregate for a minimum of 3 days production shall be separately stockpiled and tested for conformance and uniformity prior to use. The test results shall be presented to the engineer"

B4203 COMPOSITION OF ASPHALT BASE AND SURFACING MIXTURES

In the first paragraph, third last line, after "or active filler content" *add*:

"or aggregate content"

Replace the fifth paragraph with the following:

"The design of the asphalt mixes shall be in accordance with "Interim Guidelines For The Design Of Hot-Mix Asphalt In South Africa (June 2001)", and appropriate research results. The mix properties and requirements shall be as specified in the project specifications"

The relevant asphalt mixes for the base and surfacing layers shall comply with the requirements in table B4203/1.

Replace Table 4202/7 with:

TABLE B4202/7 PART 2: GRADING LIMITS FOR COMBINED AGGREGATE FOR ASPHALT SURFACING

	Sieve size (mm)	Medium Continuously graded
PERCENTAGE THROUGH SIEVE BY MASS	28	
	20	
	14	100
	10	85 – 100
	5	56 – 77
	2	33 – 48
	1	25 - 40
	0,600	18 – 32
	0,300	11 – 23
	0,150	7 – 16
	0,075	4 - 10
NOMINAL PROPORTIONS BY MASS	**AGGREGATE**	93,5%
	BITUMEN (GRADE ACCORDING TO PROJECT SPECIFICATIONS)	5,5%
	ACTIVE FILLER	1,0%

Replace Table 4203/1 with:

TABLE B4203/1: ASPHALT MIX REQUIREMENTS: BASE AND SURFACING

Property	Continuously graded surfacing mixes
Marshall Stability (kn)	8 – 18
Marshall Flow (mm)	2 – 6
Stability /Flow (kN/mm)	> 2,5
VMA (%)	> 15
VFB (%)	65 – 75
Air voids (%)	4 – 6
Indirect tensile strength @ 25°C (kPa)	> 1000
Dynamic Creep Modulus @ 40°C (MPa)	> 20
Modified Lottmann @ 7% voids (TSR)	> 0, 8
Air permeability @ 7% voids (cm^2)	$< 1 \times 10^{-8}$
Binder film thickness (microns)	5,5 – 8,0
Filler bitumen ratio	1 – 1,5
Immersion index (%)	-

B4204 PLANT AND EQUIPMENT

(f) Vehicles

Replace the second paragraph with the following:

"To minimize temperature loss all vehicles used for transporting asphalt to the site shall be fitted with thermal asphalt covers (canvas covers not acceptable) irrespective of the prevailing climatic conditions or distance of transport."

B4205 GENERAL LIMITATIONS AND REQUIREMENTS AND THE STOCKPILING OF MIXED MATERIAL

b) Moisture

Amend the last paragraph as follows:

Insert "and/or primed base" *after* "surfacing" *in the third line of the first sentence.*

Replace the last sentence with "In such case the base shall be allowed to dry out to meet the above moisture content requirement prior to placing the surface layer."

c) Surface Requirements

(iii) Tack Coat

Add the following paragraph:

"Hand spraying shall only be permitted on areas approved by the engineer. The binder distributor shall be capable to apply the binder evenly over the full area. The equipment shall comply with clause 4103. Tack coat shall be applied to all transverse and longitudinal joints by hand utilizing a paint brush."

B4206 PRODUCING AND TRANSPORTING THE MIXTURE

b) Production of the mixture

(ii) Using drum-type mixer plants

Add the following:

"Pre-blending of aggregate fractions shall not be permitted and the contractor shall ensure that sufficient cold-feed bins are installed to accommodate each individual aggregate fraction, including the filler."

c) Transporting the mixture

Delete the second sentence in this paragraph.

Add the following sub-clause:

"**f) Approval of asphalt mixture**

Before any asphalt is placed on the road, the engineer shall approve the mix design. The approval process shall be as follows:

The contractor shall prepare and submit a laboratory design mix with test results at four different bitumen contents. The design mix shall be submitted on the prescribed form D3 of TMH 10: "Instruction for the Completion of As-Built Materials Data Sheets" with all the necessary test results completed. In addition, the proposed asphalt mixture shall be subjected to gyratory testing. All the expenses in preparing and submitting the laboratory design mix shall be to the contractor's cost.

Samples of all aggregate and bitumen shall be submitted with the laboratory design mix to enable the engineer to carry out check design testing as necessary. The above design and aggregate shall be submitted to the engineer at least six weeks before it is intended to commence with any asphalt production.

After approval is obtained for the laboratory design mix, a plant mix at varying binder contents of approximately 5 to 10 tons each shall be produced. The purpose of the plant mix is for the contractor to prove that the laboratory design mix can be produced successfully. The engineer shall conduct the necessary testing on the plant mix. The plant mix shall not be placed on the road. During the production of the plant mix, the engineer shall be afforded the opportunity to inspect the asphalt plant.

After the plant mix is approved, permission shall be given for laying a trial section at varying binder contents in accordance with the requirements of section 4211 of the specifications. The engineer may require that the mix be further assessed by means of CSIR Wheel Tracking or MMLS testing, the cost of which will be borne by the Employer. Mass production of asphalt shall only commence after approval of the trial section, which should be given within a maximum of ten days.

The engineer may instruct the contractor at any time to halt his paving process and to review the whole or part of the above process should a change of aggregate properties occur, the specified asphalt requirements not being met and/or a consistent asphalt mixture not be produced."

B4208 JOINTS

Add the following to this clause:

"Where the difference in level between the new work and the existing road surface exceeds 25mm, joints shall be treated as follows:

Transverse steps at the end of a day's work shall be tapered off at a slope of 1 vertical to 20 horizontal (1:20) to tie in with the existing surface. The tapered section shall be removed before surfacing is recommenced and a joint formed in accordance with clause 4208 of the specification.

Longitudinal joints exposed to traffic shall be provided with a taper of compacted asphalt material over the full length of the exposed joint. The width of the taper shall be at least 5 times the difference in level between the old and new work.

All costs involved in the provision and removal of these temporary ramps shall be deemed to have been included in the rates tendered for the relevant asphalt payitem."

B4211 LAYING OF TRIAL SECTION

Add the following to the end of the first paragraph:

"As the purpose is not to calibrate any equipment, etc., the contractor shall calibrate the equipment and refine the mix design at his own cost."

B4213 CONSTRUCTION TOLERANCES AND FINISH REQUIREMENTS

(c) Gradings

Replace Table 4213/1 with:

TABLE B4213/1: AGGREGATE GRADING TOLERANCES

Size of aggregate passing Sieve size (mm)	Permissible deviation from target grading (%)
28	± 5
20	± 5
14	± 5
10	± 5
7	± 5
5	± 4
2	± 4
1	± 4
0,600	± 4
0,300	± 3
0,150	± 2
0,075	± 1*

* When statistical methods are applied the permissible deviation for the 0,075 fraction is ± 2%.

B4214 QUALITY OF MATERIAL AND WORKMANSHIP

b) Coring of asphalt layers

Add the following:

"A suitable coring machine shall be available on a daily basis when asphalt paving is taking place. Cores shall only be drilled, when the road temperature is 20°C or less. Core holes shall be filled with hot mix asphalt and compacted, all within 24 hours of the core being drilled. Coring shall be carried out within 48 hours after the

paving has been completed and supplied to the engineer. The test results of cores shall be submitted to the engineer within 24 hours after coring."

c) Routine inspection and tests

Add the following paragraphs:

"The contractor shall keep accurate records of:

(i) The position where every truckload of asphalt is paved (chainage, lane, time and date).
(ii) The temperatures of the asphalt in the trucks both at the mixing plant and at the paving equipment immediately prior to discharging the load.
(iii) The truck and load number from which control samples are taken. All samples taken shall be appropriately numbered.

Test results and measurements will be assessed in accordance with the provisions of section 8200."

Add the following sub-clause:

d) Special tests

n-Heptane-Xylene Equivalent (Spot test) (AASHTO-T102)

If the engineer suspects that bitumen or asphalt has been overheated, he may order that the bitumen, or the bitumen recovered from the asphalt, be subjected to the Spot Test. Recovery of binder for use in the Spot Test shall be carried out according to an approved method.

Any bitumen having an n-Heptane-Xylene equivalent in excess of 36, or in excess of the manufacturers test result on the dispatched stock, shall be considered to have been overheated and shall be deemed to be rejected unless proven otherwise."

B4215 MEASUREMENT AND PAYMENT

Amend the following payment item:

Item		**Unit**
B42.08	**100mm cores in asphalt paving**	number (no)

Amend the 1st sentence by adding the following after the word "drilled….":

"irrespective of depth of core."

Add the following payment items:

"Item		**Unit**

B42.21 Installation of speedhumps using continuously graded asphalt (using Class A-P1 modified binder and 30 mm maximum aggregate size), complete including saw cutting, tack coat and shaping but excluding signs and markings. Number

The unit of measurement shall be number of speedhumps constructed as per the project drawing.

The tendered rate must include all the incidentals such as procuring material, labour, unlimited haulage, placing, compacting and finishing the speedhump.

B42.22 Aggregate variations ..... ton (t)

The unit of measurement in respect of increases or decreases in the aggregate content from that specified in the nominal mix shall be the ton.

Payment for variations shall be made as specified for clause 1213."

SECTION B5100: PITCHING, STONEWORK AND PROTECTION AGAINST EROSION

B5102 MATERIALS

a) Stone

Replace the 2nd paragraph with the following:

"Unless suitable stone can be located on site, the stone for pitching shall come from commercial sources but, from whatever source, its use shall be subject to the prior approval of the engineer."

c) Sand

(ii) Sand for bedding

Replace this sub-sub-clause with the following:

Sand for bedding used for paving blocks shall not contain any deleterious impurities and shall comply with the requirements given in table B5102/1.

TABLE B5102/1

Sieve size (mm)	Percentage passing
10	100
5	95 – 100
2	73 – 86
1	43 - 78
0,600	25 – 60
0,300	10 - 30
0,150	5 – 15
0,075	5 - 10

Note:
Refer to standard COLTO table for COLTO grading if required

B5106 SEGMENTAL BLOCK PAVING

d) Edge beams

Add the following paragraph:

"Where concrete edge beams are constructed the relevant specifications under section 2300 shall apply."

SECTION B5400: GUARDRAILS

B5402 MATERIALS

a) Guardrails

*At the end of the 1st sentence delete the full stop and add "*or SANS 51317 and carry the SABS mark or a mark by any other SANAS approved certification body for the applicable SANS specification*."*

b) Guardrail posts

(ii) Steel posts

Replace the paragraph with the following:

*"*Where offered or instructed to be used, steel posts shall be part of an approved guardrail system as tested and complying with SANS 51317, and galvanized in compliance with the requirements of SABS 763 for type A1 articles, shall be used.

Where guardrails are placed on concrete retaining walls or concrete structures, the steel posts shall be of the type and size shown on the drawings or described in the project specifications*."*

B5403 CONSTRUCTION

a) Erection

Replace the 7th paragraph with the following:

*"*Steel posts placed on concrete retaining walls or concrete structures shall be erected and fixed as shown on the drawings. For all other applications, steel posts shall be erected and fixed in compliance with the approved guardrail system as tested and approved in terms of SANS 51317*."*

B5405 REMOVING, RENOVATING AND RE-ERECTING GUARDRAILS

a) Removing the guardrails

In the 3rd line of the 1st paragraph, after "150mm layers," *delete the full stop and add* "of suitable material (than less than G7 quality material)."

B5406 MEASUREMENT AND PAYMENT

Replace item 54.01 with the following:

"**Item** **Unit**

B54.01 Guardrails on 3.81m spaced posts

Note to Tenderer: Select and price either the timber post or steel post system – not both

(a) Complete galvanised system on:
  (i) Timber posts..... metre (m)

(b) Complete galvanised system on:
  (i) Flared ends (including end wing) ..... number (No)
  (ii) End treatments where single guardrail sections are used (including additional posts) ..... number (No)
  (iii) Horizontally curved guardrails factory bent to a radius of less than 45m ..... metre (m)

The unit of measurement for (a) and (b)(iii) shall be the metre of guardrail as erected, (including length of end treatments and curved guardrails).
The unit of measurement for (b)(i) to (b)(iii) shall be the number of end treatments of each type installed.

The tendered rates shall include full compensation for furnishing all materials and labour for erecting and galvanizing the guardrails, complete with posts, spacer blocks, bolts, nuts, washers and reinforcing plates, and excavating holes in all classes of material, concrete, backfilling and removing any surplus material. It shall also include full compensation for incidentals in respect of supplying and erecting curved guardrails, end treatments, and turned down sections.

Reflective plates and drilling and blasting will be paid for separately under items 54.06 and 54.12 respectively."

Replace item 54.02 with the following:

"**Item** **Unit**

B54.02 Guardrails on 4.0m spaced posts

(a) Complete galvanised system on:
  (i) Timber posts..... metre (m)

(b) Extra over 54.02(a) for the following
  (i) Flared ends (including end wing) ..... number (No)
  (ii) End treatments where single guardrail sections are used (including additional posts) ..... number (No)
  (iii) Horizontally curved guardrails factory bent to a radius of less than 45m ..... metre (m)

The unit of measurement for (a) and (b)(iii) shall be the metre of guardrail system (complying with SANS 51317) as erected (including length of end treatments and curved guardrails).

The unit of measurement for (b)(i) to (b)(iii) shall be the number of end treatments of each type installed.

The tendered rates shall include full compensation for furnishing all materials and labour for erecting and galvanizing the guardrails, complete with posts, spacer blocks, bolts, nuts, washers and reinforcing plates, and excavating holes in all classes of material, concrete,

backfilling and removing any surplus material. It shall also include full compensation for incidentals in respect of supplying and erecting curved guardrails, end treatments, and turned down sections.

Reflective plates and drilling and blasting will be paid for separately under items 54.06 and 54.12 respectively."

Delete items 54.03, 54.04 and 54.05 without replacement

Add the following payitem:

"**Item** **Unit**

B54.14 **Nailing of gang nail plates on top of timber guardrail posts** ..... number (No)

The unit of measurement shall be the number of gang-nail plates supplied and fixed as specified.

The tendered rate shall include full compensation for supplying all materials and labour and for fixing to the top of the sealed guardrail post."

SECTION B5600: ROAD SIGNS

B5601 SCOPE

Replace "South African Road Traffic Signs Manual" *in the second paragraph with*:

"SADC Road Traffic Signs Manual"

B5603 MANUFACTURING OF ROAD SIGN BOARDS AND SUPPORTS

a) Road signboards

Add the following:

"The contractor shall make every effort to ensure that signboards are correct in all respect and before dispatching the boards from the manufacturer's factory shall provide the engineer with a 100mm x 150mm colour photograph of each sign face for approval of the correctness of the legend. Such approval will not imply final acceptance of the board. If the contractor is in any doubt as to the correctness of the sign detail, the sign designer shall be contacted for verification."

(ii) Steel profile road signboards

Add the following:

"Chromadek section shall be assembled in accordance with the details of Typical Drawings TD-R-RS-1100 and TD-R-RS-1100.

Commented [KM1]: Typical Detail drawing Number

Where the letter or legends cross the horizontal joints of the sign panels, the letter shall be cut on the joint and both ends folded around the radius.

Retro-reflective material to adjoining Chromadek panels on a sign shall be practical visual match of the specified colour."

B5604 ROAD SIGN FACES AND PAINTING

Add the following sub-clause:

"**e) Application of retro-reflective material**

All sign faces shall be faced with retro-reflective material. Painted front sign faces shall not be used.

Where applied to Chromadek sections, retro-reflective material shall be applied as specified for aluminium section in Clause 5603(d) of the Standard Specification, and of Clause B5603(a)(ii) of this Project Specification."

B5605 STORAGE AND HANDLING

Add the following:

"The following shall not be allowed on the sign face:
- Drilling of holes, except for the fastening of overlays
- Application of any form of adhesive
- Cleaning with any chemicals that are not specifically approved by the manufacturer of the retro-reflective material.
- Covering the sign face with an impermeable material that does not allow free circulation of air."

B5606 ERECTING ROAD SIGNS

c) Erection

Add the following:

"After erection the signboard shall be thoroughly cleaned with a cleaning agent approved by the retro-reflective material's manufacturer.

All vegetation obstructing the new or replaced sign board shall be removed and disposed of as instructed by the engineer."

B5608 DISMANTLING, STORING AND RE-ERECTING EXISTING ROAD SIGNS

Add the following:

"Existing overhead and ground mounted road signs that are being replaced by new signs shall be dismantled and disposed of by the Contractor. Where possible the dismantling of the signs shall not be before the replacement sign is erected and displayed. Where dismantling of the sign is required before erection of the replacement sign, the dismantling shall not take place until immediately before work is to commence on the replacement, and the replacement shall be completed and the new sign displayed as soon as possible thereafter (within 72 hours).

Dismantling shall include sign panels and ground mounted sign supports.

Ground mounted sign supports shall be cut off just below ground level. Material excavated for removal of buried poles shall be replaced, and any depression made good using excess material from excavation for new signs.

Payitems are provided in the Pricing Schedule. Payment will differentiate between different types of sign panels."

B5609 MEASUREMENT AND PAYMENT

Item		**Unit**
B56.01	**Road sign boards with painted or coloured background. Symbols, lettering, semi-matt black or in Class I where the sign board**	**semi-matt and borders in retroreflective material, is constructed from**

Amend the last two lines of the second paragraph to read:

"completion, delivery, installation of the road sign board complete as specified, and the removal and disposal of all vegetation obstructing the motorists' view of the new or replaced sign board."

Add the following payment items:

"**Item**		**Unit**
B56.10	**Danger plates at culverts/structures *(W401 - 800 x 200mm)***.....	number (No)

The unit of measurement shall be the number of danger plates provided and erected in accordance with the drawings.

The tendered rate shall include full compensation for all labour and material, painting, posts, excavation, backfilling with soil etc., as may be necessary for completing the work in accordance with the details shown on the drawings.

Item		**Unit**
B56.11	**Replace marker boards on existing kilometre posts** .	number (No)

The unit of measurement shall be the number of reference marker boards provided and attached to existing kilometre posts in accordance with the drawings.

The tendered rate shall include full compensation for the manufacturing and supplying of the completed marker boards, for attaching the marker board to existing posts along the route and for all materials equipment, labour, nuts and bolts necessary for attaching the marker board as specified."

SECTION B5700: ROAD MARKINGS

B5701 SCOPE

Replace "South African Road Traffic Signs Manual" *in the second paragraph with*:

"SADC Road Traffic Signs Manual"

Replace the words "ordinary road marking paint" *with "*solvent borne road marking paint".

Replace "BS 3262" *with* "EN 1436".

Replace "Hot melt plastic road marking" *with* "thermoplastic road marking".

B5702 MATERIALS

Insert the following before subclause (a) Paint:

"The selection of the appropriate road marking paint and materials for permanent road markings to ensure conformance with the requirements of this specification rests with the contractor. Such paint and material shall have technical characteristics (brightness, luminance, skid resistance, durability) equal to or greater than road marking paint and materials specified in subclauses 5702(a), (b) and B5702(c).

Where plastic road-marking material (hot-melt plastic (also known as thermoplastic) and two-component (also known as cold plastic)) is used, the contractor shall obtain an approved guarantee from the manufacturer that the paint complies with the specification. This shall be submitted to the Engineer on request."

Replace sub-subclause B5702(a)(i) with the following:

"(i) Road marking paint

Road marking paint shall be Type 1 as specified in SANS 731-1. Only paint, manufactured in a SANS approved and accredited facility shall be accepted. The no-pick-up time of road-marking paint shall comply with the Class 1 requirement in accordance with SANS 731-1.

The paint shall be delivered at the site in sealed containers marked in accordance with SANS 731-1.

The viscosity of the paint shall be such that it can be applied without being thinned down."

Replace sub-subclause B5702(a)(iii) with the following:

"(iii) Thermoplastic road marking material

Thermoplastic road marking material shall comply with the requirements of EN 1436, and EN 1423: 1998 for drop-on glass beads for road marking and anti-skid aggregates and mixtures thereof. Blending of thermoplastic road marking material and glass beads shall comply with EN 1424: 1998.

The binder shall be an elasticized synthetic resin and the material shall be reflectorized by mixing in 25% by mass Class A glass beads in accordance with EN 1424: 1998. An additional topping of glass beads shall be applied to the hot

surface of the material for instant retro-reflectivity.

The white road marking material shall contain 6% by mass minimum titanium dioxide content and shall have a skid resistance of 45 S.R.T. – units or higher. SABS Method 1248: 1995 shall be used for determination of traffic wear index; indication of durability.

The following minimum lumination values are required for the completed product:

- 250 mcd/m^2.lux & 120 mcd/m^2.lux for white & yellow lines respectively, at 30 days after application.
- 200 mcd/m^2.lux & 100 mcd/m^2.lux for white & yellow lines respectively, at 6 months after application.

Determination of coefficient of retro-reflected luminance by means of portable retro-reflectometer shall be carried out using SANS 6261: 2008. Application of the permanent roadmarking will thus have to be performed within the first 6 months of the 12 month defects liability period to allow for the second measurement to fall within the contract dates. Should the application of the permanent road-marking fall outside the first half of the defects liability period for whatever reason, the settlement of the retention money will be delayed until the second measurement of luminance can be performed at the stipulated time and the required adjustment can be made to the tendered rate (if required).

Two-component cold plastic road marking material shall be used for symbols, arrows and letters (hand painted markings) unless otherwise instructed by the Engineer."

Add the following sub-subclause:

"(v) Cold plastic road marking material

Cold plastic road marking material shall be used for symbols, arrows and letters (hand painted markings) and shall consist of a solvent-free reactive acrylic resin, stuffing, beads and pigment to which a hardener shall be added. Application is carried out using a trowel. Material applied by paint brush shall not be used.

Cold plastic road marking material shall be reflectorized by mixing in 25% by mass (or 400g/m^2) Class A glass beads in accordance with EN 1424: 1998. An additional topping of glass beads is applied to the wet surface of the material after application and will comply with EN 1423: 1997."

b) Roadstuds

Replace the clause with the following:

"Permanent and temporary road studs shall comply with the requirements of the European Standard for road studs IS EN 1463.

Road studs for the areas of application shall be supplied and installed in accordance with the requirements set out in Table B5702/1 with reference to IS EN 1463.

TABLE B5702/1

Classification	Area of Application			
	RSA-1	**RSA-2**	**RSA-3**	**RSA-T**
Description	Bi-directional	Bi-directional	Circular Cats-Eye	Bi-directional
Material	Galvanized Cast Iron	Plastic	Glass	Plastic
Design	Type A	Type A	Type A	Type A
Use	Type P	Type P	Type P	Type T
Reflector	Type 1	Type 1	Type 1	Type 2
Reflectivity	R1	R1	R1	Not Specified
Installation System	Anchored	Bonded	Embedded	Self Adhesive or Bonded
Height above Road	H3	H3	H3	H1
Dimensions (min-footprint)	100mmx80mm	100mmx100mm	100mm dia	100mmx100mm
Colours	W – R - Y	W – R -Y	W	W – R - Y
Road Trials	S1	S1	S1	Not Applicable

Add the following sub-item:

"c) Retro-reflective beads

Retro-reflective glass beads shall be applied to the wet paint, thermoplastic and cold plastic.

The beads shall comply with Class A beads in accordance with EN 1424: 1998, with the following requirements or as approved by the Engineer:

- colour : crystal clear
- roundness : > 80%
- size range of : 14 – 200 US Mesh (75 – 1400 Microns)
- refractive index : > 1.5
- specific gravity : ± 2.5
- granulometry :

CUMULATIVE RETAINED MASS		
SIEVE	**MINIMUM**	**MAXIMUM**
1700	0	2
1400	0	10
1180	5	30
850	40	80
600	70	100
425	80	100
355	90	100
212	95	100
PAN	100	100

The beads shall be delivered to the site in sealed bags, marked with the name of the manufacturer, the batch number and an inspection seal of SANS, confirming that the beads form part of a lot tested by SANS and comply with the requirements of EN 1424: 1998. Alternatively, the Contractor shall at all times have a SANS certificate on the site, identifying the batches to which the inspection seals apply and certifying that they have been tested by SANS, and comply with the requirement of EN 1424: 1998."

B5704 MECHANICAL EQUIPMENT FOR PAINTING

Add the following sentence at the end of the first paragraph:

"The road-marking machine shall be fitted with a device to guide the operator to the centre of the line to be painted. This device shall be used at all times of operation."

B5705 SURFACE PREPARATION

4. *Add the following at the end of the second paragraph:*
5.

"The onus is on the contractor to ensure that the surface on which the road markings are to be applied is sufficiently clean and dry to ensure that the quality of the road markings will not be adversely affected. The contractor is also responsible for protecting road studs from being painted over, and the subsequent cleaning thereof if such over-painting did occur."

B5706 SETTING OUT THE ROAD MARKINGS

Insert the following before the first paragraph:

"Where road markings are to be replaced after any construction activity, it is essential that all existing road marking be accurately surveyed and referenced before commencement of such construction activities which will obliterate the existing road markings. The position of barrier lines shall be re-assessed on site by the engineer before the contractor commences with the road marking."

B5707 APPLYING THE PAINT

Insert the following before the first paragraph:

"The Contractor's establishment on site and general obligation shall be deemed to fully include the establishment of the road-marking team, irrespective of the number of times the road-marking team is required to be on site or is required to move within the site.

Provision is also made under item B57.07 for de-establishment and re-establishment in the contract or defects notification period if such action is required by delays not attributable to the contractor and/or ordered by the Engineer."

Replace the sixth paragraph with the following:

"Solvent borne road marking paint shall be applied at a nominal rate of 0,42ℓ/m^2 or as directed by the Engineer. Thermoplastic road marking shall be applied at a nominal rate of 2,5 kg/m^2 to achieve a minimum thickness of 1,25mm to 1,5mm or as directed by the Engineer. The two-component road marking material shall be applied by hand by means of a trowel. The desired symbol or line shall be marked with a tape or a template on the road surface. Thereafter apply the required volume of material and spread uniformly over the entire area. When dry/set, remove the tape or template. A spreading rate of 4,5kg/m^2 is estimated to achieve a 2,0mm material thickness.

In order to ensure proper coverage on all types of surfaces the Engineer may order an increase in the above nominal application rates. Payment for these variations in application rates shall be made under item 57.04.

A daily log-sheet, provided by the Employer, shall be completed and signed by the Contractor and the Engineer's representative, recording the quantities of paint and glass beads used on that day and shall be available for inspection at all times. The completed and signed log-sheet for the period covered by a payment certificate shall be attached to the payment certificate."

Replace the last paragraph with the following:

"Solvent-based road marking as specified by the Engineer shall be carried out within 14 days of opening the road full width to traffic after the completion of the surfacing.

If in the in the opinion of the Engineer, conditions are unsafe, the centre-line shall be painted immediately after 2,0 km of continuous road has received a new asphalt layer, or 4,0 km of continuous road has received a new seal surfacing."

B5708 APPLYING THE RETRO-REFLECTIVE BEADS

In the first paragraph, replace the nominal application rate of 0,8kg/litre with "400gm/m2*".*

Replace the second paragraph with the following:

"The thermoplastic road marking material and two-component road marking material shall contain insitu glass beads of minimum content of 25% in order to obtain night visibility (reflectivity). The contractor shall immediately apply additional glass beads at 400g/m^2 to obtain immediate reflectivity. The beads shall be sprayed onto the road marking layer by means of a pressure sprayer. Where letter, symbol, traverse line and island road marking is undertaken by hand, the glass beads may be applied by hand if approved by the Engineer. Prior to any hand application work, the contractor shall first request approval from the Engineer."

Add the following:

"Beads shall be applied in accordance with EN 1424."

B5710 TOLERANCES

Add the following paragraphs to subclause (c) Alignment of markings*:*

”When an unbroken line and a broken line are painted alongside each other, the beginning and the end of the unbroken line shall coincide with the beginning of one broken line and the end of another broken line. When existing lines are repainted, the new markings shall not deviate more than 100mm in the longitudinal direction nor 10 mm in the transverse direction from the existing marking.

The alignment of the road studs shall not deviate from the true alignment by more than 10mm and shall be positioned so that the reflective faces are within 5° of a right angle to the centre line of the road.”

Add the following subclause:

“e) Testing

(1) Plant

Before painting any permanent road markings, the Contractor shall satisfy himself and the Engineer, by painting test lines on a section of pavement other than the section required to be marked:

(i) that the painting machine is in good working order and properly adjusted;
(ii) that the operator is fully experienced; and
(iii) that the machine sprays at the specified rate of paint application.

The Contractor shall bear the cost of all materials and workmanship required for the above plant tests.

In addition, the Contractor shall conduct random paint thickness tests and dip/spread tests as required by the Engineer.”

B5711 GENERAL

Insert the following into the last sentence of the last paragraph between “black paint” *and* “or chemical paint remover”:

“, bituminous emulsion, slurry”

Add the following to the last paragraph:

“Where black paint is used, it shall be matt.”

Add the following clause:

”The Contractor shall provide temporary traffic control facilities in accordance with Section 1500 of the COLTO’s standard specifications for road and bridge works to ensure traffic safety where work is being executed.

Property and/or road signs damaged by the Contractor, his personnel, his agents or sub-contractors shall be repaired or restored to their condition prior to the damage at his own cost.”

B5712 FAULTY WORKMANSHIP OR MATERIAL

Add the following paragraphs to this item:

"The Contractor shall rectify in an acceptable manner and at his own costs; all marking that do not comply with the specified requirements.

While work is in progress, tests shall be carried out on materials and/or the quality of work to ensure compliance with the specified requirements. The sampling methods are specified in SANS 731-1. The sampling methods described in TMH5 shall be followed where applicable."

B5713 PROTECTION

Add the following paragraph

"Traffic cones shall not be smaller than 750mm in height and shall be placed on the road not further than 48m apart. Cones shall not be removed before the paint on the road has hardened to such an extent that it will not be damaged by traffic and the adhesive of the road studs has hardened to such an extent that the studs will not turn or become loose. All marks on the road caused by traffic driving over wet paint shall be removed by the Contractor at his own cost."

B5714 MEASUREMENT AND PAYMENT

Amend the heading for payitem B57.03 as follows:

"

Item		**Unit**
B57.03	**Thermo-plastic road-marking paint**	kilometre (km)"

Add the following after the third paragraph:

"Full payment of the tendered rate will be applicable upon completion of the application of the road-marking paint. However, should the coefficient of retro-reflected luminance fall below the required minimum levels as specified in paragraph B5702 above, payment will be reduced on the following sliding scale :

White lines:
- Below 250 mcd/m2.lux at 30 days : minus 10 % of the tendered rate
- Below 200 down to 180 mcd/m2.lux at 6 months : minus 10% of the reduced rate
- Below 180 down to 160 mcd/m2.lux at 6 months : minus 20% of the reduced rate
- Below 160 down to 140 mcd/m2.lux at 6 months : minus 30% of the reduced rate

Yellow lines:
- Below 120 down at 30 days: minus 20 % of the tendered rate
- Below 100 down to 80 mcd/m2.lux at 6 months: minus 20% of the reduced rate

The reduction in the tendered rate applicable for failing to meet the specified minimum luminance level at the 30 days and 6 months measurement dates shall be applied accumulative in the certificate immediately following the date of measurement."

Amend payitem 57.05 by replacing the payitem heading with the following:

"**Item** **Unit**

B57.05 Roadstuds (installation and maintenance) ”

(a) RSA-1 ..... number (No)

(b) RSA-2 ..... number (No)

(c) RSA-3 ..... number (No)

(d) RSA-T ..... number (No)

Add the following after the first sentence of the second paragraph of payitem 57.05:

“No additional payment will be made should temporary or permanent road studs be replaced if lost or broken during the construction period or during the Defects Notification Period.”

Item **Unit**

B57.06 Setting out and pre-marking the lines (excluding traffic island markings, lettering and symbols) ..... kilometre (km)

Add the following:

“Referencing of existing barrier lines and other road marking lines prior to milling and other operations, shall be included in the tendered rate for setting out and pre-marking.”

Amend payitem 57.07 by replacing the payitem heading with the following:

“Item **Unit**

B57.07 Re-estabilshing the painting unit at the end of the defects notification period lump sum”

In the 4th line of the 1st paragraph delete the word “maintenance” and replace with “defects notification”

Add the following payitems:

“**Item** **Unit**

B57.10 Cold plastic road marking material

(a) White lettering and symbols ..... square metre (m^2)

(b) Yellow lettering and symbols..... square metre (m^2)

(c) Transverse lines, painted island and arrestor bed markings (any colour) ..... square metre (m^2)

The unit of measurement for applying the roadmarking material for the lettering, symbols, transverse lines, islands and arrestor bed markings shall be the square metre, and the quantity to be paid for shall be the actual surface area of the lettering, symbols, transverse lines, islands and arrestor bed markings, completed in accordance with the instructions of the Engineer.

The tendered rate per square metre for applying the road marking material shall include full compensation for procuring and furnishing all material, including the retro-reflective beads and all necessary equipment, and for applying, protecting and maintenance as specified, including the setting out of lettering, symbols, transverse lines, islands and arrestor bed markings.

Item		Unit
B57.11	**Re-establishing the painting unit on instruction of the Engineer during the construction period**	number (No)

The unit of measurement shall be the number of times the painting unit is re-established on site on instruction of the Engineer.

The Contractor's establishment on site and general obligation shall be deemed to fully include the establishment of the road-marking team, irrespective of the number of times the road-marking team is required to be on site or is required to move within the site.

Provision is made under payment item 57.07 for de-establishment and re-establishment in the contract or maintenance period if such action is required by delays not attributable to the contractor and/or ordered by the Engineer.

The tendered rate shall include full compensation for re-establishing the complete painting unit on the site and the subsequent removal of all special equipment, personnel, etc., for painting the road-traffic markings during the construction period."

SECTION B5800: LANDSCAPING AND PLANTING PLANTS

B5801 SCOPE AND DEFINITION

a) *Delete this paragraph and replace with*

"This section includes all areas affected by construction activities. It includes landscaping, grassing, rehabilitation, erosion protections and planting trees and shrubs.

b) Definition

WEEDS

Delete the following:

"(as listed in bulletin 413 issued by the Department of Agriculture, Directorate of Agricultural Information)"

and replace it with:

"(as listed in the Conservation of Agricultural Resources Act)"

B5802 MATERIALS

c) Grass seeds

Add the following:

"The grass seed mixture shall be as follows:

i) (specify type) (specify kg/ha)
ii) (specify type) (specify kg/ha)
iii) (specify type) (specify kg/ha)
iv) etc.
Total (specify kg/ha)"

e) Grass sods

Delete "until they are placed" *and add* "once placed for planting".

(i) <u>Nursery-grown sods</u>

Add the following:

"The sods shall be free of weeds, weed seeds, insects and fungal diseases."

(ii) <u>Veld sods</u>

Add the following:

"The sods shall be free of weeds, weed seeds, insects and fungal diseases."

g) Topsoil

Add the following at the end of the first paragraph:

"The contractor shall be responsible for the control of any germination of weed seeds within topsoil used on site."

Add the following at the end of the second paragraph:

"Areas such as stockpiles, borrow pits and spoil sites shall be stripped of all topsoil before work may commence within the area. Should a larger site for any of the above be required during construction, the contractor shall refer to the DEO for best practice methods on ensuring the preservation of the additional stripped topsoil."

Add the following paragraph:

"The topsoil shall be kept free of all foreign material generated during construction. This shall include all stone and bituminous products. Topsoiling shall not be accepted should it contain any of the above material."

B5804 PREPARING THE AREAS FOR PLANTS

b) Areas which do not require topsoil

Replace:

"50mm" with "20mm " and "150mm" with "20mm"

Add the following:

"In areas with large natural rock, i.e. not blasted or excavated rock, these rocks may be placed so as to look like a natural part of the landscape"

Add the following sub-clause:

"**g) Removal of undesirable vegetation**

During the course of the Contract the engineer may instruct the contractor to physically remove undesirable vegetation from within the road reserve. Such an operation will take place before the flowering stage of the undesirable vegetation upon written instruction from the engineer, but shall not relieve the contractor of his obligation towards weeding sodded, grassed areas as described under 5806(a) and any area directly affected by any construction activity. Should the contractor fail to respond to the written instruction from the engineer for the removal of the aforementioned undesirable vegetation before flowering, the contractor shall be held contractually responsible for any growth or seeding of said vegetation for a period of not less than twenty four (24) months in the affected area."

B5805 GRASSING

a) Planting grass cuttings

2nd paragraph – remove "be covered with 30mm of approved soil". *Replace with*:

"have the root system of the grass cuttings thoroughly planted within the topsoil layer to ensure good growth. No part of the grass root system shall be left protruding from the topsoil".

Remove “and, when sufficiently dry, shall be rolled with a light agricultural roller”

b) Sodding

Add the following:

“Grass sods obtained from a commercial grass farm shall be used for the following:

- A 1m wide strip shall be placed next to the road edge where no gravel shoulder exists.

- A 0,5m wide strip shall be placed adjacent to all concrete-lined drains. Full sodding must be used for grass-lined drains. This sodding shall extend over the entire drainage channel, including the tops of the sides. The use of grass sods will commence from the point of acceptance of water, up to the safe discharge of water. No area shall be left without grass sods within the drainage channel should it provide a risk of erosion.

- A minimum of a 1m wide strip shall be placed over the shoulder breakpoint for all fill slopes.

- Full sodding to be used for all slopes steeper than 1:2. Any slope that exceeds 3m in width shall be sodded, the type of which shall be determined by the slope.”

f) Sowing by hand

Delete the following:

“If approved by the engineer,”

Replace the second sentence with:

“The top 20mm of prepared topsoil shall be raked away in sections, the seed shall then be spread uniformly within the prepared area. The top 20mm topsoil shall then be raked over the seedbed, ensuring an even thickness. This method is to be systematic, and where applicable, follow the contours of any slopes.”

Add the following:

“The thickness of the topsoil layer shall be as specified by the engineer. The preparation of the soil of the soil for areas to be grassed is to include scarifying just before sowing the grass seed. Should erosion of any kind (by animal, wind or rain) have occurred before the contractor applies the grass seed, the slope shall be re-instated, at the contractor’s cost, to its original, erosion free state before seeding.

The types and mixtures of seeds to be used shall be as specified in the project specifications. The contractor shall be solely responsible for establishing an acceptable grass cover, and any approval by the engineer of seed mixtures intended for use by the contractor shall not relieve him of his responsibility”.

B5807 TREES AND SHRUBS

a) Positions of trees and shrubs

Add the following:

"(x) No median shall be planted with shrubs, should the median width be less than 10m wide."

B5808 GENERAL

Add the following subitems:

"**f) Weeding**

The contractor shall maintain all areas affected by construction activities free of all undesirable plant species. They shall be removed before the flowering stage of each species. Should the contractor fail to remove the alien plant species before flowering he shall be held responsible for alien plant removal within the affected area, for an additional period of one year, over and above the contractual one year defects liability period.

The method for the removal of undesirable plant species shall be either by hand, which shall include the removal of the complete root system, or by chemical means, through the use of a registered selective herbicide. A registered, licensed pest control operator, licensed for the industrial application of herbicides, shall only administer the application of the herbicide.

g) Establishment of vegetation within areas disturbed by construction activities

The engineer shall assess any area within the construction boundaries that has been disturbed by construction activities, but which is not scheduled for formal revegetation within the contract. The assessment shall include whether re-vegetation is required. These disturbed areas, none the less remain the contractor's responsibility for the removal of alien vegetation (see 5807(e))."

B5809 MEASUREMENT AND PAYMENT

Item **Unit**

B58.03 Preparing the areas for grassing

(f) Stockpiling topsoil (free haul 1,0km) where the following applies:

i) topsoil stored at a stockpile site agreed with by the engineer ..... cubic metre (m^3)
ii) topsoil pushed or bladed into heaps next to area from which it was taken ..... cubic metre (m^3)

f) Stockpiling the topsoil

Delete from the first paragraph, the last sentence: "Only material loaded ..... approved area".

Add the following payitem:

"**Item** **Unit**

B58.12 Removal of undesirable vegetation ..... kilometre (km)

The unit of measurement shall be the linear kilometre measured along the road centerline and within the road reserve, and measured each time the contractor has been instructed by the engineer to remove the undesirable vegetation under this payitem. This item shall not include areas of undesirable vegetation that have occurred within areas affected by construction activities, which are considered a contractual obligation (5807(e)).

The tendered rate shall include full compensation for all plant, equipment, labour and consumables required to effectively remove the undesirable vegetation, including the entire root system, and disposing by approved means."

SECTION B5900: FINISHING THE ROAD AND ROAD RESERVE AND TREATING OLD ROADS

B5901 SCOPE

In the first line of the second paragraph, insert the following after 'this section'

"…distinguishes between new construction and renewal construction. When construction is new, as in the case of new alignments for example, then this section "

B5902 FINISHING THE ROAD AND ROAD RESERVE

Retain the existing paragraphs as sub-clause:

"**a) New construction**"

Replace the sixth paragraph with:

"All materials resulting from the finishing operations shall be disposed of at approved spoil sites."

Add the following:

"**b) Renewal construction**

After completing construction work within the site, the contractor shall ensure that all construction generated or related material that may have been swept, windrowed, stockpiled, stored or spread beyond the road surface is removed. This shall be done before any other rehabilitation work is undertaken, including shaping, topsoiling and grassing. Should, during the removal of construction generated or related material, existing vegetation or topsoil be disturbed or destroyed, the contractor shall, at his own cost, re-instate the road reserve to its original state. This shall include ripping, should the construction material have compacted the existing surface.

Culvert in lets and outlets, culvert barrels, and open drains shall be cleared of debris, soil, silt and other material generated from the construction activities.

The surfacing shall be cleared of all dirt, mud and foreign objects. Dragging, pushing or scraping material across the finished surfacing shall not be permitted.

All junctions, intersections, islands, kerbing and other elements making up the completed works shall be neatly finished off.

The contractor shall ensure that all undesirable plants have been removed from the road reserve and borrow pit areas.

All materials resulting from the finishing operations shall be disposed of at approved spoil sites."

B6102 MATERIALS

(c) Crushed stone

Add the following new paragraphs to the end of subclause 6102(c):

"The foundation fill to be constructed below each of the new box culverts shall include a crushed stone foundation fill blinded with crusher dust:

(i) Crushed stone

The crushed stone shall be material with a maximum size of 250 mm as obtained from first stage crushing operations, procured from commercial sources.

(ii) Crusher dust

The grading of the crusher dust shall be as specified in clause 4302(b)(ii) Table 4302/11 of the COLTO standard specifications for a Type 1 coarse slurry (maximum size 9,5 mm). The crusher dust shall be procured from commercial sources."

Add the following new subclause to the end of clause 6102:

"(j) Concrete blinding screed

The concrete blinding screed to the top of each foundation fill immediately below the box culvert barrel shall be constructed from class 15/19 concrete."

B6103 GENERAL

(a) Subsurface data

Add the following new paragraphs to the end of subclause 6103(a):

"The existing box culverts have been in place for many years, and are all founded below the water table level within natural drainage courses. The nature of the foundation fill constructed below each of these box culverts is not known. The box culverts are to be demolished entirely then replaced.

Owing to the unstable ground conditions prevailing, test pits could only be excavated at box culvert nos. 3 and 4, several metres from the respective water courses. The collapse of these test pits due to seepage at shallow depth indicates that the saturated conditions are not confined to the stream beds. In addition, a dynamic probe light (DPL) investigation was carried out at the inlet and outlet ends of each of the four box culverts.

These geotechnical investigations indicate that the in situ soils comprise saturated and submerged very loose fine silty to clayey sandy soils with very low bearing capacity of the order of only approximately 70 kPa maximum at 3,0 m depth below the culvert invert level.

The new construction cannot be supported at shallow depth on these fine saturated sands. The extent, low strength and high deformability of the very loose fine grained slightly clayey sands with a surface water table are factors which adversely impact on the design and construction of the culvert foundation and its subsequent behaviour. These materials are weak

as characterised by low DPL blows.

Since acceptable bearing strengths are only obtainable at considerable depths, some strength reinforcement in the form of a crushed stone foundation fill will be required in the upper sand horizon.

Additional foundation investigations and/or tests shall be required by the engineer once the existing box culverts or box culvert components have been demolished, in order to ascertain the nature and depths of the existing underlying foundation fills. These additional foundation investigations and/or tests shall be completed at each box culvert site prior to the commencement of the excavations for the proposed crushed stone foundation fill at that box culvert.

Only once these additional foundation investigations and/or tests have been completed at each of the three box culverts that were demolished in their entirety, will a final decision be taken by the engineer as to whether the entirety or any part of the existing foundation fill at those three box culverts should be preserved. It is noted that, for tender purposes, the scheduled quantities have been calculated on the basis of the entire existing foundation fill at these three box culverts being removed and replaced."

B6104 ACCESS AND DRAINAGE

(b) Access

Add the following new paragraphs to the end of subclause 6104(b):

"The contractor shall take particular note of the saturated stream banks, the submerged stream beds, and the unstable ground conditions prevailing at each box culvert location, which will require the construction of pioneer access roads on the unstable ground in order to allow access to the heavy plant required for the various construction operations, and which will also require extensive dewatering infrastructure and dewatering operations to control the flow throughout the period of construction of each foundation fill and box culvert.

Moreover, the placing of the crushed stone foundation fill shall require that the excavations are fully dewatered, in order to ensure that the excavation is the correct width, length and depth when the crushed stone is placed and in order to allow visual monitoring of the initial penetration of the crushed stone into the underlying soils."

B6105 EXCAVATION

(c) Excavation

Add the following new paragraphs to the end of subclause 6105(c):

"The contractor, in choosing his excavation plant, shall need to take into account the saturated stream banks, the submerged stream beds, and the unstable ground conditions prevailing at each box culvert location, and the need to carry out the excavation operations using pioneer access roads.

The excavation plant chosen shall therefore require adequate bucket capacity and reach in order to excavate the saturated materials while positioned outside of the excavation profile on the flanking pioneer access roads.

Should the plant provided have insufficient bucket capacity and/or reach to complete the excavations while positioned outside of the excavation profile on the flanking pioneer access

roads, then the contractor shall have to operate from pioneer access roads initially located within the excavation profile, and these access roads will then have to be removed then reconstructed outside of the excavation profile as the work proceeds."

(g) The safety of excavations

Add the following to the end of subclause 6105(g):

"The contractor shall also comply with his obligations for ensuring the safety of excavations in terms of Part E: OHSA 1993 Health and Safety Specification in section C3.3 Particular Specifications.

The contractor shall note that the box culverts are founded below the water table level within natural drainage courses. The necessary precautions taken by the contractor to safeguard the stability and safety of the excavations and adjacent structures shall therefore take particular account of the partial and fully saturated and submerged soil conditions prevailing and the effects of fluctuations in the stream level and velocity."

B6108 BACKFILL AND FILL NEAR STRUCTURES

i) **(a) General**
ii)
iii) *Add the following at the end of the first sentence of subclause 6108(a)(i):*
iv)
v) "Throughout the backfilling operation at each box culvert, the elevations of this placed material behind the opposite outer barrel walls shall not differ by more than 0,3m."

B6109 FOUNDATION FILL

Add the following at the end of the second last paragraph of clause 6109:

"Concrete blinding shall extend 100 mm beyond the horizontal dimensions of all formed box culvert floor slabs in order to facilitate the placing of the formwork, unless otherwise directed by the engineer. The concrete blinding shall be constructed accurately to the final levels of the underside of each box culvert floor slab."

Add the following to the end of clause 6109:

"Concrete blinding and mass concrete fill shall be given a wood float finish."

Add the following new subclause to the end of clause 6109:

"(a) Crushed stone foundation fill below the box culverts

(i) Extent of the foundation fill

In order to assist with stress distribution through the depth and width of the foundation fill, the excavations shall be such that the completed foundation fill, measured at a depth of 1,5 m below the level of the underside of the box culvert barrel, extends a distance of 3 m measured in plan beyond the boundaries of the box culvert barrel's outer perimeter, as detailed on the drawings.

(ii) Construction of the foundation fill

The crushed stone foundation fill material shall be stockpiled adjacent to the excavations so

that it is readily available for placement within the excavation.

Unless otherwise instructed by the engineer prior to the commencement of the excavation, the excavation shall be carried out so as to provide a minimum depth of excavation of 1,5 m below the level of the underside of the box culvert barrel, to accommodate the foundation fill of plan dimensions as described in subsubclause B6109(a)(i) above.

After inspecting this initial 1,5 m minimum depth of dewatered excavation, the engineer may then instruct that the depth be increased in terms of clause 6106 of the COLTO standard specifications in order to achieve suitable founding conditions.

Once the final dewatered excavation is ready to receive the foundation fill, the crushed stone shall be placed inside the excavation. This shall be carried out either by end tipping then dozing the material into the excavation, or, if this proves unsafe or impractical given the unstable ground conditions, by using an excavator to dump the rock into the excavation and spread it.

It is expected that the crushed stone will initially penetrate the underlying very loose fine silty to clayey sandy soils, settling downwards to displace the sands and also consolidating the sands at lower depth with an associated increase in strength.

The crushed stone shall initially be brought up to such a level that heavy compaction plant can operate safely on the surface. This initial layer and every subsequent layer from this level to the final surface shall be compacted using a 12 tonne flat wheel vibratory roller, operating statically initially to lock the crushed stone particles together, following which the crushed stone surface must be subjected to continuous vibratory passes until such time as all settlement appears to have been attained. Notwithstanding any earlier such visual confirmation with respect to attaining all the settlement, each such layer shall nonetheless be compacted with at least eight roller passes over the entire surface.

Care must be exercised during these operations to guard against possible collapse, due to dilation of the soils as a result of a silt or clay content within the sands leading to a reduction in the effective stresses being developed. This may be observed in the initial rolling, exhibited by heave as the rolling proceeds. Should this be the case then compaction must be postponed for a period to allow for pore pressure dissipation.

Once a sound final platform has been achieved, the top layer must be blinded, initially with crusher dust followed by a 75 mm thick concrete screed. The crusher dust shall be placed, spread and then subjected to at least eight passes of the 12 tonne flat wheel vibratory roller to induce it to fill the voids in the rock layer, after which the concrete screed may be placed. Excess crusher dust shall be removed from the surface in order to prevent a situation arising in which the crusher dust forms a distinct erodible layer (subject to subsequent possible wash away and accompanying settlement of the structure) on which the blinding, and hence the culvert barrel, bears. The blinding shall instead bear directly onto the crushed stone, the purpose of the crusher dust being to help lock the crushed stone in position by filling the upper voids, which will also help prevent excessive concrete losses when the blinding screed is placed."

SECTION 6200: FALSEWORK, FORMWORK AND CONCRETE FINISH

B6203 GENERAL

Add the following to the end of the first paragraph of clause 6203:

"The contractor shall also comply with his obligations for ensuring the safety of all falsework and formwork in terms of Part E: OHSA 1993 Health and Safety Specification in section C3.3 Particular Specifications.

The contractor shall note that the box culverts are founded below the water table within natural drainage courses. The design of all falsework and formwork shall therefore take particular account of the partially and fully saturated and submerged soil conditions prevailing, the effects of fluctuations in the stream level and velocity, and the effects of the obstruction to the stream channel caused by such falsework and formwork.

The design of the entire falsework and formwork infrastructure used to access and temporarily support the box culvert structures shall be carried out by a professional engineer (registered as such by the Engineering Council of South Africa (ECSA)) who specialises in the design of falsework and formwork. The same professional engineer specialist shall inspect and approve the falsework and formwork as erected."

B6204 DESIGN

(a) General

Add the following to the end of the final paragraph of subclause 6204(a):

"All such design criteria, calculations and detail drawings shall be signed by a professional engineer (registered as such by the Engineering Council of South Africa (ECSA)).

The contractor shall respond within 72 hours to any queries the engineer may have with respect to the design and drawings and calculations for the falsework and formwork."

B6205 CONSTRUCTION

(a) Falsework

Add the following to the end of the first paragraph of subclause 6205(a):

"Before the falsework is loaded with the permanent works, all the falsework, including any access falsework, shall be inspected by the registered professional engineer referred to in clause B6203 above, who shall sign off the falsework erection, confirming in writing that it has been erected in accordance with the approved drawings and that it is capable of safely resisting the loads that will be imposed during the construction of the permanent works."

B6206 REMOVING THE FALSEWORK AND FORMWORK

Add the following to the end of the last paragraph of clause 6206:

"No portion of the box culvert support falsework and formwork shall be removed before the contractor has obtained authorisation from the engineer to effect such removal."

SECTION 6300: STEEL REINFORCEMENT FOR STRUCTURES

B6303 STORING THE MATERIALS

Add the following at the end of the first paragraph of clause 6303:

"The contractor shall set aside areas cleared of vegetation for storing reinforcing steel. The reinforcement shall be kept at least 300 mm above ground level at all times."

B6305 SURFACE CONDITION

Add the following new paragraph to the end of clause 6305:

"Within 24 hours after placing concrete, the contractor shall have cleaned off all concrete splatter from the protruding starter bars and clips and any other affected reinforcement, and shall present the resulting product to the engineer for approval before he will be permitted to commence fixing the shuttering and reinforcement to the next section. The contractor's attention is drawn to the fact that, for the concrete mixes used on this contract, this splatter is extremely hard to remove if not done within 24 hours of placing the concrete."

B6307 COVER AND SUPPORTS

Replace the sixth paragraph of clause 6307 with the following:

"Prior to fixing the reinforcing steel, samples of the proposed cover and spacer blocks shall be submitted to the engineer for approval. Only concrete cover and spacer blocks shall be used, and they shall be made with 6,7 mm maximum sized aggregate. They shall be of the same strength and material source as those of the surrounding concrete and shall have the same water : cement ratio to minimise differences in shrinkage, thermal movements and strain. The blocks shall be formed in specially manufactured moulds and the concrete compacted on a vibratory table and cured under water for a period of at least 14 days, all to the satisfaction of the engineer."

Concrete cover block support and spacers shall be provided at all corners and along all edge reinforcement of a structural element at even spacing intervals not exceeding those specified below. Between edges, concrete cover block support and spacers shall be provided to the sides and soffits of structural elements so as to form an evenly spaced orthogonal grid at spacing intervals not exceeding those specified below. Where smaller bars effectively support larger bars between support points, the maximum spacing interval between support points shall be determined by the diameter of the smaller bar.

Nominal diameter of bar supported (mm)	**Maximum spacing interval (mm)**	
vi)	High tensile steel	Mild steel
8	500	400
10 and 12	600	500
16 and 20	1200	1000
25 and 32	1800	1500

Notwithstanding the maximum spacing intervals specified above, these spacing intervals shall be reduced where necessary to ensure that the tolerances specified in subclause 6803(f) are

met, or where particular circumstances require a closer cover block spacing to be used."

SECTION 6400: CONCRETE FOR STRUCTURES

B6402 MATERIALS

Replace subclause 6402(a) with the following:

(a) Cement

"Refer to clause B1229 with regard to the new SABS cement specifications."

Only the following cements may be used in the construction work for the box culverts:

Plain and reinforced concrete members and units	
Cement Type	Cement Grade
CEM II A-S	42,5
CEM II A-V	32,5
CEM II B-S	42,5
CEM II B-V (or W)	32,5
CEM III A	32,5

(b) Aggregates

Add the following new subclause to the end of subclause 6402(b):

"(vi) The maximum chloride ion content of the fine aggregate for all reinforced concrete shall be 0,01% by mass of aggregate as measured by SANS 1083:2002."

B6404 CONCRETE QUALITY

(b) Strength concrete

Add the following new paragraph after the end of the first paragraph of subclause 6404(b):

"The water : cement ratio for all strength concrete shall not exceed 0,48."

B6407 PLACING AND COMPACTING

(a) General

Add the following paragraph at the start of subclause 6407(a):

"The contractor shall also comply with his obligations for ensuring safety during the placing and compacting of concrete in terms of Part E: OHSA 1993 Health and Safety Specification in section C3.3 Particular Specifications."

Add the following paragraphs to the end of subclause 6407(a):

"The concreting operations for all box culvert elements shall require careful planning, and sufficient concrete product and concreting resources such as labour, tools, equipment and plant shall be made available on each day of concreting to ensure that the concrete

construction planned for that day is successfully achieved.

One month before the programmed date for the first element of box culvert concreting, the contractor shall be required to submit to the engineer for his approval a detailed method statement fully covering the proposed concreting operations required to construct the box culvert. The method statement shall, inter alia, include details of labour and supervision, tools and equipment (wheel barrows, spades, poker vibrators, hoists, chutes, etc.), plant (batching plant, concrete dumpers, cranes, pumps, etc.), ready mix supplier details and proposed schedule of concrete delivery times (if ready mixed concrete is to be used), sequence of construction, curing method to be used, contingency plans and health and safety obligations. Box culvert concrete shall only be placed once the engineer is satisfied that every reasonable effort has been made by the contractor to ensure the success of the concrete placing operation. The approved method statement shall then apply to all other box culvert concreting operations, and any amendments required to the approved method statement shall also be approved by the engineer prior to implementation."

(b) Placing

Add the following paragraph at the start of subclause 6407(b):

"Immediately prior to placing concrete, the concrete surfaces against which the concrete is to be placed shall be cleaned off of all foreign material using high pressure water jetting and / or compressed air and / or such other methods as may prove necessary under the circumstances. Pooled water shall be blown off using compressed air."

B6408 CONSTRUCTION JOINTS

(a) General

Add the following at the start of subclause 6408(a):

"No construction joints other than those indicated on the drawings shall be permitted without the written approval of the engineer. In all cases the proposed method of forming the joint shall be discussed and agreed with the engineer prior to placing the concrete."

B6415 DEMOLITION AND REMOVAL OF EXISTING STRUCTURAL CONCRETE

Add the following to the end of clause 6415:

"Demolition by explosive means shall not be carried out under this contract. The demolition work shall be carried out using non-explosive means only, such as pneumatic plant or equipment."

B6606 DRAINAGE FOR STRUCTURES

(c) Synthetic-fibre filter fabric

Add the following at the end of subclause 6606(c):

"The filter fabric wrapping the geopipe and the drainage strips behind the box culvert barrel and earwing walls shall comply with grade 2 in accordance with the COLTO standard specifications subsubclause 2104(a)(iii) Table 2104/2."

Add the following new clause at the end of Section 6600:

"B6609 LOCATING EXISTING REINFORCEMENT, DRILLING HOLES AND INSTALLING DOWELS IN THE EXISTING CONCRETE AT BOX CULVERT NO. 3

(a) Scope

The contractor shall supply and install dowels at the existing box culvert no. 3 as detailed on the drawings.

(b) Materials

The dowel grouting mortar shall be Hilti HIT-HY 150 fast curing mortar (or equivalent as approved by the engineer).

(c) Locating existing reinforcement and drilling the holes

Steel reinforcement shall not be cut or damaged during the drilling process. After setting out the hole positions and prior to drilling the holes, the contractor shall use a cover meter to locate the position of any existing reinforcement in the vicinity of the holes. Should any existing reinforcement be detected that may obstruct the drilling path, or should any existing unsound concrete be visible in the vicinity of the drilling path, the contractor shall notify the engineer and seek further instruction prior to drilling the holes.

The contractor shall drill the holes to the required dimensions as detailed on the drawings. Core drilling of the dowel holes shall not be permitted.

The drilling operation shall not cause spalling, cracking, or other damage to the surrounding concrete, and any concrete spalled or otherwise damaged by the contractor's drilling operations shall be repaired at the contractor's cost in a manner acceptable to the engineer.

(d) Installation of the dowels

The contractor shall clean the holes using compressed air to remove all deleterious material, including dust and debris, and shall ensure that the holes are dry prior to placing the dowel grouting mortar. Holes that are started but not completed, or not provided with a dowel, shall be cleaned and filled with an approved proprietary patching material at the contractor's cost in a manner acceptable to the engineer.

The handling and placement of the dowel grouting mortar shall conform to the manufacturer's written instructions. All excess dowel grouting mortar shall be struck-off flush with the concrete surface and removed from the surrounding concrete surface area.

The dowels shall be clean, dry and free of deleterious material immediately prior to installation in the holes.

The contractor shall maintain the dowels centrally within the holes and at the required embedment depth during the setting of the dowel grouting mortar, and shall take such measures as may be required to prevent the loss of the dowel grouting mortar from the holes."

SECTION 6700: STRUCTURAL STEELWORK

B6701 SCOPE

Add the following to the end of clause 6701:

"All drainage inlet grids and frames, manhole step-irons, mild steel plate, the high yield stress steel reinforcement bars fixing the gabion mattresses to the apron slabs, and any other manufactured articles requiring galvanising in terms of this contract, shall be hot-dip galvanised in accordance with the specifications in this section."

B6705 FABRICATION AND ASSEMBLY

(m) Corrosion prevention

(iii) Galvanising

Delete the second sentence of the first paragraph of subclause 6705(m)(iii) and replace it with the following:

"All manufactured articles which are to be hot-dip galvanised shall be fabricated for galvanising in accordance with the guidelines given in the following specifications, as applicable:

SANS 14713-1:2011 (ISO 14713-1:2009)	Zinc coatings - Guidelines and recommendations for the protection against corrosion of iron and steel in structures Part 1: General principles of design and corrosion resistance
SANS 14713-2:2011 (ISO 14713-2:2009)	Zinc coatings - Guidelines and recommendations for the protection against corrosion of iron and steel in structures Part 2: Hot dip galvanising
SANS 14713-3:2011 (ISO 14713-3:2009)	Zinc coatings - Guidelines and recommendations for the protection against corrosion of iron and steel in structures Part 3: Sheradizing
SANS 32:1997 (EN 10240:1997)	Internal and / or external protective coatings for steel tubes – Specification for hot dip galvanised coatings applied in automatic plants

The manufactured articles shall be hot-dip galvanised in accordance with the following specification:

SANS 121:2011 (ISO 1461:2009)	Hot dip galvanised coatings on fabricated iron and steel articles –Specifications and test methods

The coating thickness for these articles shall comply with Table 3 of the SANS 121 (ISO 1461) specification."

Delete the second paragraph of subclause 6705(m)(iii) and replace it with the following:

"All nuts, bolts, screws and threaded articles shall be hot-dip galvanised in accordance with the SANS 121 (ISO 1461) specification, and the coating thickness shall comply with Table 4 of the SANS 121 (ISO 1461) specification."

Add the following new paragraph to the end of subclause 6705(m)(iii):

"No zinc drips or webbing of the zinc coating will be permitted on any hot-dip galvanised articles."

COLTO SERIES 8000: SUNDRIES

SECTION B8100: TESTING MATERIALS AND WORKMANSHIP

B8102: TESTING METHODS

Insert the following as a new first paragraph:

"Where reference is made to TMH test methods in this specification or the standard specifications, it shall be replaced with the relevant current published SANS test method."

B8105 TESTING OF AGGREGATES

Add the following sub-clause:

"**g) Determination of Ethylene Glycol Durability Index**

The Ethylene Glycol Durability Index shall be determined as follows:

(i) Apparatus

Suitable pans or basins

Ethylene Glycol solution

Stirring rod

(ii) Method

Obtain three or more representative samples from the source to be evaluated.

If not already crushed, crush the material in order to obtain sufficient minus 19mm plus 13mm sized aggregate in order to totally cover the bottom of the basin or pan with a single layer of stone. Add sufficient ethylene glycol to each basin ensuring that every aggregate particle is completely submerged.

After soaking for 24 hours, gently stir the aggregate and allow to settle. Observe and record the response of the aggregate to the ethylene glycol according to the criteria listed in (iii) below. Continue the above cycle at intervals of 24 hours for a further 4 days, in each case recording the observed response. After 5 days allow the samples to remain submerged in the solution and observe and record the disintegration response after a total period of 15, 30 and 60 days have elapsed.

(iii) Classification of response

After each cycle, classify and record the response of the aggregate as follows:

DISINTEGRATION CLASS

Class 1: No obvious effects, or only very minor spalling of sand sized particles or very small flakes.

Class 2: Splitting of rock, accompanied by any other disintegrative effects.

Class 3: Fracturing (spheroidal and/ or internal) without extensive spalling or distortion.

Class 4: Fracturing (spheroidal and/or internal) with extensive spalling or distortion.

Class 5: Complete disintegration.

TIME CLASS

The time factor in the above disintegrative process is classified according to the time taken for the most serious effect of the expansive stresses to occur i.e.

Class 4: 0 - 5 days
Class 3: 6 - 15 days
Class 2: 16 - 30 days
Class 1: 31 - 60 days
Class 0: Over 60 days

(iv) Determination of Glycol Durability Index

The Ethylene Durability Index is determined by adding the class number as assigned for the specific disintegrative response observed to the class number as assigned for the period for this response to occur. A durability index ranging from 1 (no response) to 9 (rapid and complete disintegration) is thus determined."

B8108 DETERMINING THE TOTAL APPROXIMATE DRY BULK RELATIVE DENSITY AND THE APPARENT DENSITY

Add the following at the end of this clause:

"For materials where the total water absorption, when determined according to SANS 3001-AG20 (replacing TMH1 Method B14) and SANS 3001-AG21 (replacing TMH1 Method B15), is in excess of 1,5%, the Apparent Density shall be calculated in accordance to the following formula:

$$\frac{(b - a)}{(d - a) + \{ (w - 1.0)/100 \times (b - a) \} - (c - b)}$$

This formula shall be used as an alternative to note (5) regarding soaking period, when so instructed by the engineer."

B8110 TESTS RELATING TO CHEMICAL STABILISATION

Add the following sub-clause:

"**d) The Wet-Dry Durability Test for cement and/or lime-treated materials using the hand-brush method (SANRAL METHOD)**

1. Scope

This method covers the procedure for determining the soil-cement losses obtained by repeated wetting, drying and hand brushing of hardened soil-cement specimens (see 5.4).

2. Apparatus

2.1 A moisture curing room capable of maintaining a relative humidity of 95 to 100 percent and a temperature of 22 to 25°C, or suitable plastic bags capable of holding specimens and carriers in an air tight condition in a water bath as described in 2.2 below.

2.2 A suitable water bath with thermostatic control capable of maintaining a temperature of 22 to 25°C.

2.3 A balance to weigh up to 10kg, accurate to 0.5g.

2.4 A drying oven capable of maintaining temperatures of 71 ± 3°C and 110 ± 5°C.

2.5 A wire scratch brush made of 50mm by 1.6mm flat 26 gauge wire bristles assembled in 50 groups of 10 bristles and mounted to form five longitudinal rows and 10 transverse rows on a 200 by 65mm wooden block.

3. Method

3.1 *Preparation of specimens*

Prepare specimens in accordance with the procedure described in the Appendix to method A19 in the TMH 1 with the following exceptions:

Use the material passing the 37.5mm sieve and discard the material remaining on the sieve.

Use the apparatus and compaction method as described in SANS 3001-GR30 (replacing TMH 1 method A7) (100% Modified AASHTO at predetermined OMC).

3.2 *Curing of specimens*

Rapid cure the specimens (see 5.6). Alternatively, and where instructed by the engineer, the specimens may be cured for seven days at a relative humidity of 95% to 100% and a temperature of 22°C to 25°C in a suitable curing room or in plastic bags and a suitable water bath.

3.3 *Wetting, drying and brushing*

After curing, remove the specimens from the curing room or plastic bags, allow to cool and submerge them in water at room temperature for a period of five hours. Remove the specimens from the water and place them in an oven at 71°C for 42 hours.

Remove the specimens from the oven. Give each specimen two firm strokes over the full surface area with the wire scratch brush. The brush must be held parallel to the long axis of the specimen or parallel to the ends as required to cover all areas of the specimen. Apply these strokes to the full height and width of each specimen with a firm stroke corresponding to approximately 13.5 kN force (see note 5.5).

3.4 *Determination of soil-cement losses*

After 12 cycles, dry the specimens to constant mass at 100°C and determine the oven dry mass of the specimens. The data collected will permit the calculation of the soil-cement losses of the specimens after the prescribed 12-cycle test.

4. Calculations

4.1 Calculate the soil-cement loss of the specimens as a percentage of the original oven-dry mass of the specimens as follows:

$$L = \frac{W - N}{W} \times 100$$

Where

L = soil-cement loss (%)

W = original calculated oven-dry mass (g) (calculated according to paragraph 3.5 in the Appendix to method A19 in the TMH 1).

N = final oven-dry mass (g).

4.2 The percentage loss shall be calculated and reported to the nearest 0.1 percent. The results are normally required for stabilisation design purposes and should be reported graphically against relevant cement contents.

5. Notes

5.1 Mass determinations of the specimens before and after brushing are usually made at the end of each cycle during research or special investigations.

5.2 Care is required when assessing results obtained on very coarse graded materials as "plucking" out of the aggregate pieces during the brushing process could result in very high losses of material, which may however not be truly indicative of its potential erosion resistance.

5.3 If it not possible to run the cycle continuously because of Sundays or holidays, or for any other reason, the specimens should be held in the oven during the layover period.

5.4 The test was originally developed to determine wet-dry durability of cement-treated material. It can, however, be used with equal success on material tested with other chemical stabilizers, for example lime, or mixes of lime and milled blast furnace slag, or cement and milled blast

furnace slag.

5.5 The pressure of the brushing stroke is determined as follows:

Clamp a specimen in a vertical position on the edge of a platform scale and zero the scale. Apply vertical brushing strokes to the specimen and note the force necessary to register approximately 1.36kg.

5.6 Rapid curing:

Seal each specimen airtight in a suitable container or plastic bag. Carefully place the briquettes on suitable holders or in pans and place in the oven at the relevant temperature and period given below:

Stabilizing agent	Temp (°C)	Time (Hours)
Cement	70 – 75	24 ±0.5
PBFC	70 - 75	24 ±0.5
Lime	60 ±2	45 ±1
Lime / FA	60 ±2	45 ±1
Lime / MBFS	60 ±2	45 ±1

B8114 GEOTEXTILE AND GEOTEXTILE – SOIL COMPATIBILITY TESTS

Add the following new sub-clause:

"**c) Other Tests:**

i. Thickness (mm):
The thickness of the material shall be specified by the contractor (or supplier).
Thickness and compressibility tests shall be carried out in accordance with Code of Practice SABS 0221:1988. The Testing of Geo-textile, to check that the material supplied conforms to the thickness specified by the contractor.

ii. Mass per unit area (g/m^2):
Testing shall be carried out in accordance with Code of Practice SABS 0221.

iii. Tensile strength (kN/m):
Testing shall be carried out in accordance with Code of Practice SABS 0221.

iv. Penetration load (kN):
Testing shall be carried out in accordance with Code of Practice SABS 0221.

v. Puncture resistance (mm):
Testing shall be done in accordance with test procedures laid down by CSIR, Pretoria.

vi. Permeability (l/s/m^2):
Testing shall be carried out in accordance with Code of Practice SABS 0221."

B8117 MEASUREMENT AND PAYMENT

Amend payitem 81.02 as follows:

Item		Unit

B81.02 Other special tests requested by the engineer

"(a) Employer's contribution to concrete durability tests

(i) Tests for water sorptivity ..... (Provisional sum)

(ii) Tests for oxygen permeability ..... (Provisional sum)

(iii) Tests for chloride conductivity..... (Provisional sum)

(iv) Tests for concrete cover..... (Provisional sum)

(b) Other tests ..... (Provisional sum)

The provisional sum provided to cover the cost of special tests as requested by the engineer in terms of clause 8115 shall be expended in accordance with the provisions of the FIDIC Conditions of Contract. Payment will not be made for any special tests should the result indicate that the specifications have not been complied with."

Employer	Witness 1	Witness 2	Contractor	Witness 1	Witness 2

SECTION 8200: QUALITY CONTROL (SCHEME 1)

B8201 SCOPE

Add the following paragraph:

"Quality Control Scheme 1 as specified in section 8200 shall apply to this contract."

B8206 JUDGEMENT PLAN B

Notes (Table 8206/3)

Replace note 1(a) with the following:

(a) Density L_s = 93% of theoretical maximumdensity for the surfacing (Rice's density, see also clause B4210). The maximum density for the surfacing is 96.5% of theorectical maximum density."

Replace note 1(c) with the following:

"Voids in Mix (Srufacing):
L_s = specified values – 1 percentage point
L'_s = specified values + 1 percentage point

C5. OHS Specifications for Construction Projects

5.1. Specifications

1. PREAMBLE

In terms of Construction Regulation 4(1)(*a*) of the Occupational Health and Safety Act, 1993 (Act 85 of 1993), the Department of Public Works, as the Client and/or its Agent on its behalf, shall be responsible to prepare Health & Safety Specifications for any intended construction project and provide any Principal Contractor who is making a bid or appointed to perform construction work forthe Client and/or its Agent on its behalf with the same.

The Client's further duties are as described in The Act and the Regulations made there-under. The Principal Contractor shall be responsible for the Health & Safety Policy for the site in terms of Section 7 of the Act and in line with Construction Regulation 5 as well as the Health and Safety Plan for the project.

This 'Health and Safety Specifications' document is governed by the "Occupational Health and Safety Act, 1993 (Act No. 85 of 1993), hereinafter referred to as 'The Act'. Notwithstanding this, cognizance should be taken of the fact that no single Act or its set of Regulations can be read in isolation. Furthermore, although the definition of Health and Safety Specifications stipulates 'a documented specification of all health and safety requirements pertaining to associated works on a construction site, so as to ensure the health and safety of persons', it is required that the entire scope of theLabour legislation, including the Basic Conditions of Employment Act be considered as part of the legal compliance system. With reference to this specification document this requirement is limited to all health, safety and environmental issues pertaining to the site of the project as referred to here-in. Despite the foregoing, it is reiterated that environmental management shall receive due attention.

Due to the wide scope and definition of construction work, every construction activity and site will be different, and circumstances and conditions may change even on a daily basis. Therefore, due caution is to be taken by the Principal Contractor when drafting the Health and Safety Plan based on these Health and Safety Specifications. Prior to drafting the Health and Safety Plan, and in consideration of the information contained here-in, the contractor shall set up a Risk Assessment Program to identify and determine the scope and details of any risk associated with any hazard at the construction site, in order to identify the steps needed to be taken to remove, reduce or control such hazard. *This Risk Assessment and the steps identified will be the basis or point of departure for the Health and Safety Plan.* The Health and Safety Plan shall include documented 'Methods of Statement' (see definitions under Construction Regulations) detailing the key activities to be performed in order to reduce as far as practicable, the hazards identified in the Risk Assessment.

2. SCOPE OF HEALTH AND SAFETY SPECIFICATION DOCUMENT

The Health and Safety Specifications pertaining to the project; "Makhushane Water Scheme Phase 5A" etc. etc. – *see paragraph 8 on page 13*), cover the subjects contained in the index and isintended to outline the normal as well as any special requirements of the Department pertaining to thehealth and safety matters (including the environment) applicable to the project in question. These Specifications should be read in conjunction with the Act, the Construction Regulations and all other Regulations and Safety Standards which were or will be promulgated under the Act or incorporated into the Act and be in force or come into force during the effective duration of the project. The stipulations in this specification, as well as those contained in all other documentation pertaining tothe project, including contract documentation and technical specifications shall not be interpreted, iany way whatsoever, to countermand or nullify any stipulation of the Act, Regulations and Safety Standards which are promulgated under, or incorporated into the Act.

3. PURPOSE

The Department is obligated to implement measures to ensure the health and safety of all people and properties affected under its custodianship or contractual commitments, and is further obligated to monitor that these measures are structured and applied according to the requirements of these Health and Safety Specifications.

The purpose of this specification document is to provide the relevant Principal Contractor (and his /her contractor) with any information other than the standard conditions pertaining to construction sites which might affect the health and safety of persons at work and the health and safety of personsin connection with the use of plant and machinery; and to protect persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work during the carrying out of construction work for the Department of Public Works. The Principal Contractor (and his /her contractor) is to be briefed on the significant health and safety aspects of the project and to be provided with information and requirements on inter alia:

a) safety considerations affecting the site of the project and its environment;
b) health and safety aspects of the associated structures and equipment;
c) submissions on health and safety matters required from the Principal Contractor (and his /her contractor); and
d) d) the Principal Contractor's (and his /her contractor) health & safety plan.

To serve to ensure that the Principal Contractor (and his /her contractor) is fully aware of what is expected from him/her with regard to the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) and the Regulations made there-under including the applicable safety standards, and inparticular in terms of Section 8 of the Act.

To inform the Principal Contractor that the Occupational Health and Safety Act, 1993 (Act 85 of 1993) in its entirety shall apply to the contract to which this specification document applies. The Construction Regulations promulgated on 18 July 2003 and incorporated into the above Act by Government Notice R 1010, published in Government Gazette 25207 shall apply to any person involved in construction work pertaining to this project, as will the Act.

4. DEFINITIONS

"Purpose of the Act" –

To provide for the health and safety of persons at work and the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work; to establish an advisory council for occupational health and safety; and to provide for matters connected therewith.

"Agent" –

means any person who acts as a representative for a client;

"Client" –

means any person for whom construction work is performed;

''*Construction Work''* is defined as any work in connection with –

(a) the erection, maintenance, alteration, renovation, repair, demolition or dismantling of oraddition to a building or any similar structure;
(b) the installation, erection, dismantling or maintenance of a fixed plant where such workincludes the risk of a person falling;
(c) the construction, maintenance, demolition or dismantling of any bridge, dam, canal, road, railway, runway, sewer or water reticulation system or any similar civil engineering structure; or
(d) the moving of earth, clearing of land, the making of an excavation, piling, or any similar type of work;

"Contractor" –

means an employer, as defined in Section 1 of the Act, who performs construction work and includes Principal Contractors;

"Health and Safety File" –

means a file, or other record in permanent form, containing the information required a contemplated in the regulations;

"Health and Safety Plan" –

means a documented plan which addresses hazards identified and includes safe work procedures to mitigate, reduce or control the hazards identified;

"Health and Safety Specification" –

means a documented specification of all health and safety requirements pertaining to the associated works on a construction site, so as to ensure the health and safety of persons;

"Method Statement" –

means a document detailing the key activities to be performed in order to reduce as reasonably as practicable the hazards identified in any risk assessment;

"Principal Contractor" –

means an employer, as defined in section 1 of the Act who performs construction work and is appointed by the client to be in overall control and management of a part of or the whole of a construction site;

"Risk Assessment" –

means a program to determine any risk associated with any hazard at a construction site, in order to identify the steps needed to be taken to remove, reduce or control such hazard.

5.1 Structure and Organisation of OH&S Responsibilities

5.1.1. Overall Supervision and Responsibility for OH&S

*The Client and/or its Agent on its behalf to ensure that the Principal Contractor, appointed in terms of Construction Regulation 4(1)(c), implements and maintains the agreed and approved H&S Plan. Failure on the part of the Client or Agent to comply with this requirement will not relieve the Principal Contractor from any one or more of his/her duties under the Act and Regulations.

*The Chief Executive Officer of the Principal Contractor in terms of Section 16 (1) of the Act to ensure that the Employer (as defined in the Act) complies with the Act. The pro forma Legal Compliance Audit may be used for this purpose by the Principal Contractor or his/her appointed contractor.

*All OH&S Act (85 /1993), Section 16 (2) appointee/s as detailed in his/her/their respective appointment forms to regularly, in writing, report to their principals on matters of health and safety per routine and ad hoc inspections and on any deviations as soon as observed,regardless of whether the observation was made during any routine or ad hoc inspection and to ensure that the reports are made available to the principal Contractor to become part of siterecords (Health & Safety File).

*The Construction Supervisor and Assistant Construction Supervisor/s appointed in terms of Construction Regulation 8 to regularly, in writing, report to their principals on matters of health and safety per routine and ad hoc inspections and on any deviations as soon as observed, regardless of whether the observation was made during any routine or ad hoc inspection and to ensure that the reports are made available to the principal Contractor to become part of site records (Health & Safety File).

*All Health and Safety Representatives (SHE-Reps) shall act and report as per Section 18 of the Act.

5.1.2. Legal Appointments

Several appointments or designations of responsible and /or competent people in specific areas of construction work are required by the Act and Regulations. The following competent appointments, where applicable, in terms of the Construction Regulations are required to ensure compliance to the Act, Regulations and Safety Standards.

Required appointments as per the Construction Regulations: -

Item	Regulation	Appointment	Responsible Person
1.	5(1)(s)	Principal contractor for each phase or project	Client
2.	7(1)(c)	Contractor	Principal Contractor
3.	8(1)	Construction Manager	Contractor
4.	8(7)	Construction supervisors	Construction Manager
5.	8(8)	Construction supervisor sub-ordinates	Contractor
6.	8(6)	Construction Safety Officer	Contractor
7.	9(1)	Person to carry out risk assessment	Contractor
8.	9(3)	Trainer/Instructor	Contractor
9.	10(1)(a)	Fall protection planner	Contractor
10.	12(3)(a)	Formwork & support work supervisor	Contractor
11.	12(3)(f)	Formwork & support work examiner	Contractor
12.	13(1)	Excavation supervisor	Contractor
13.	13(2)(b)(ii)(bb)	Professional engineer or technologist	Contractor
14.	13(2)(k)	Explosives expert	Contractor
15.	14(1)	Supervisor demolition work	Contractor
16.	14(2) + (3)	Demolition expert	Contractor
17.	14(11)	Explosives expert	Contractor
18.	16(1)	Scaffold supervisor	Contractor
19.	17(1)	Suspended platform supervisor	Contractor
20.	17(2)(c)	Compliance plan developer	Contractor

21.	17(8)(c)	Suspended platform expert	Contractor
22.	17(13)	Outrigger expert	Contractor
23.	19(8)(a)	Material hoist inspector	Contractor
24.	20(1)	Batch plant supervisor	Contractor
25.	20(2)	Batch plant operator	Contractor
26.	24(d) and (e)	Power tool expert	Contractor
27.	24(d) and (e)	Power tool controller	Contractor
28.	22(a)	Tower crane operator	Contractor
29.	23(1)(d)(i)	Construction vehicle and mobile plant operator	Contractor
30.	23(1)(k)	Construction vehicle and mobile plant inspector	Contractor
31.	24(d)	Temporary electrical installations inspector	Contractor
32.	24 (e)	Temporary electrical installations controller	Contractor
33.	28 (a)	Stacking and storage supervisor	Contractor
34.	29 (h)	Fire equipment inspector	Contractor

This list may be used as a reference or tool to determine which components of the Act and Regulations would be applicable to a particular site, as was intended under paragraph 3 & 4 of the Chapter "Preamble" (page 4) above. This list must not be assumed to be exclusive or comprehensive.

5.2 Communication & Liaison

5.2.1 OH&S Liaison between the Employer, the Principal Contractor, the other Contractors, the Designer and other concerned parties shall be through the Project Committee as per the procedures determined by the Project Committee.

5.2.2 In addition to the above, communication may be directly to the Client or his appointed Agent, verbally or in writing, as and when the need arises.

5.2.3 Consultation with the workforce on OH&S matters will be through their Supervisors and H&S Representatives ('SHE – Reps')

17. The Principal Contractor will be responsible for the dissemination of all relevant OH&S information to the other Contractors e.g. design changes agreed with the Client and/or its Agent on its behalf and the Designer, instructions by the Client and/or his/her agent, exchange of information between Contractors, the reporting of hazardous/dangerous conditions/situations etc.

6. RESPONSIBILITIES

6.1 Client

6.1.1 The Client or his appointed Agent on his behalf will appoint each Principal Contractor for this project or phase/section of the project in writing for assuming the role of Principal Contractor as intended by the Construction Regulations and determined by the Bills of Quantities.

6.1.2 The Client or his appointed Agent on his behalf shall discuss and negotiate with the Principal Contractor the contents of the health and safety plan of the both Principal Contractor and Contractor for approval.

6.1.3 The Client or his appointed Agent on his behalf, will take reasonable steps to ensure that the health and safety plan of both the Principal Contractor and Contractor is implemented and maintained. The steps taken will include periodic audits at intervals of at least once every month.

6.1.4 The Client or his appointed Agent on his behalf, will prevent the Principal Contractor and/or the Contractor from commencing or continuing with construction work should the Principal Contractor and/or the Contractor at any stage in the execution of the works be found to:

- have failed to have complied with any of the administrative measures required by the Construction Regulations in preparation for the construction project or any physical preparations necessary in terms of the Act;
- have failed to implement or maintain their health and safety plan;
- have executed construction work which is not in accordance with their health and safety plan; or
- act in any way which may pose a threat to the health and safety of any person(s) present on the site of the works or in its vicinity, irrespective of him/them being employed or legitimately on the site of the works or in its vicinity.

6.2 Principal Contractor

6.2.1 The Principal Contractor shall accept the appointment under the terms and Conditions of Contract. The Principal Contractor shall sign and agree to those terms and conditions and shall, before commencing work, notify the Department of Labour of the intended construction work in terms of Regulation 3 of the Construction Regulations. Annexure B of this Specification contains a "Notification of Construction Work" form. The Principal Contractorshall submit the notification in writing prior to commencement of work and inform the Client or his Agent accordingly.

6.2.2 The Principal Contractor shall ensure that he is fully conversant with the requirements of this Specification and all relevant health and safety legislation. This Specification is not intended to supersede the Act nor the Construction Regulations or any part of either. Those sections of the

Act and the Construction Regulations which apply to the scope of work to be performed bythe Principal Contractor in terms of this contract (entirely or in part) will continue to be legally required of the Principal Contractor to comply with. The Principal Contractor will in no manner or means be absolved from the responsibility to comply with all applicable sections of the Act, the Construction Regulations or any Regulations proclaimed under the Act or which may perceivable be applicable to this contract.

6.2.3 The Principal Contractor shall provide and demonstrate to the Client a suitable and sufficiently documented health and safety plan based on this Specification, the Act and the Construction Regulations, which shall be applied from the date of commencement of and for the duration of execution of the works. This plan shall, as appendices, include the health and safety plans of all Sub-contractors for which he has to take responsibility in terms of this contract.

6.2.4 The Principal Contractor shall provide proof of his registration and good standing with the Compensation Fund or with a licensed compensation insurer prior to commencement with the works.

6.2.5 The Potential Principal Contractor shall, in submitting his tender, demonstrate that he has made provision for the cost of compliance with the specified health and safety requirements, the Act and Construction Regulations. (Note: This shall have to be contained in the conditions of tender upon which a tenderer's offer is based.)

6.2.6 The Principal Contractor shall consistently demonstrate his competence and the adequacy of his resources to perform the duties imposed on the Principal Contractor in terms of this Specification, the Act and the Construction Regulations.

6.2.7 The Principal Contractor shall ensure that a copy of his health and safety plan is available on site and is presented upon request to the Client, an Inspector, Employee or Sub-contractor.

6.2.8 The Principal Contractor shall ensure that a health and safety file, which shall include all documentation required in terms of the provisions of this Specification, the Act and the Construction Regulations, is opened and kept on site and made available to the Client or Inspector upon request. Upon completion of the works, the Principal Contractor shall hand over a consolidated health and safety file to the Client.

6.2.9 The Principal Contractor shall, throughout execution of the contract, ensure that all conditions imposed on his Sub-contractors in terms of the Act and the Construction Regulations are complied with as if they were the Principal Contractor.

6.2.10 The Principal Contractor shall from time to time evaluate the relevance of the Health and Safety Plan and revise the same as required, following which revised plan shall be submitted to the Client and/or his/her Agent for approval.

7. SCOPE OF WORK

These specifications are applicable to the specific scope of work pertaining to the project as detailed in the tender documents. *Refer to Project Specification.*

8. HEALTH AND SAFETY FILE

The Principal Contractor must, in terms of Construction Regulation 5(7), keep a Health & Safety File on site at all times that must include all documentation required in terms of the Act and Regulations and must also include a list of all Contractors on site that are accountable to the Principal Contractor and the agreements between the parties and details of work being done.

The Health and Safety File will remain the property of the Client and/or its Agent on its behalf throughout the period of the project and shall be consolidated and handed over to the Client and/or itsAgent on its behalf at the time of completion of the project.

The safety file shall contain the following documentation:

- safety records
- notification documents
- appointment letters
- records of incidents
- records of safety meetings
- records of PPE provision

- and any other documented related to safety issues on site.

9. MONITORING AND REVIEWING OH&S PERFORMANCE

The Principal Contractor is required to maintain an acceptable incident rate and report on this to the Client and/or its Agent on its behalf on a monthly basis. The frequency rates must reflect permanent disability, lost workdays, restricted workdays, medical treatment and first aid treatment.

10. HAZARDS AND DEVELOPMENT OF RISK ASSESSMENTS

The Principal Contractor is required to develop Risk Assessments, Standard Working Procedures (SWP) and Method Statements for each activity executed in the contract or project. This identification of hazards is over and above the hazards identification programme and those hazards identified during the drafting of the Health and Safety Plan. Hazard identification should be conducted continuously over and above the baseline risk assessment.

11. ARRANGEMENTS FOR MONITORING AND REVIEW

11.4 Monthly Audit by Client

The Client and/or its Agent on its behalf will be conducting Periodic Audits at times agreed with the Principal Contractor Audit to comply with Construction Regulation 4(1)(*d*) to ensure that the principal Contractor has implemented, is adhering to and is maintaining the agreed and approved OH&S Plan.

11.5 Other audits and inspections by client and/or its agent on its behalf.

The Client and/or its Agent on its behalf reserves the right to conduct any other ad hoc audits and inspections as it and/or its Agent on its behalf deem necessary.

A representative of the Principal Contractor and the relevant Health and Safety Representative(s) (SHE-Reps) must accompany the Client and/or its Agent on its behalf on all Audits and Inspections and may conduct their own audit/inspection at the same time. Each party will, however, take responsibility for the results of his/her own audit/inspection results. The Client and/or its Agent on its behalf may require to be handed a copy of the minutes of the previous Health and Safety Committee meeting reflecting possible recommendations made by that committee to the Employer for reference purposes and any other related issues

11.6 Rports

11.3.1 The Principal Contractor shall report all incidents where an employee is injured on duty to the extent that he/she dies, becomes unconscious, loses a limb or part of a limb, is injured or becomes ill to such a degree that he/she is likely either to die or to suffer a permanent physical defect or likely to be unable for a period of at least 14 days either to work or continue with the activity for which he/she was usually employed or where a major incident occurred,the health or safety of any person was endangered, where a dangerous substance wasspilled, the uncontrolled release of any substance under pressure took place, machinery orany part of machinery fractured or failed resulting in flying, falling or uncontrolled moving objects, machinery ran out of control, to the Provincial Director of the Department of Labour within seven days and at the same time to the Client and/or its Agent on its behalf.

11.3.2 The Principal Contractor is required to provide the Client and/or its Agent on its behalf with copies of all statutory reports required in terms of the Act and the Regulations.

11.3.3 The Principal Contractor is required to provide the Client and/or its Agent on its behalf with a monthly “SHE Risk Management Report”.

11.3.4 The Principal Contractor is required to provide a.s.a.p. the Client and/or its Agent on its behalf with copies of all internal and external accident/incident investigation reports. As soon as the occurrence of any accident/incident of whatever nature comes to the notice of the Principal

Contractor, it shall be reported immediately to any of the following:

*the Occupational Health and Safety Section of the Pretoria Regional Office of the Dept. of Public Works.

11.7 Review

The Principal Contractor is to review the Hazard Identification, Risk Assessments and Standard Work Processes at each Production Planning and Progress Report meeting as the construction work develops and progresses and each time changes are made to the designs, plans and construction methods and processes. The Principal Contractor must provide the Client and/or its Agent on its behalf, other Contractors and all other concerned parties with copies of any changes, alterations or amendments.

11.8 Site Rules and other Restrictions

11.8.1 Site OH&S Rules

The Principal Contractor must develop a set of site-specific OH&S rules that will be applied to regulate the Health and Safety Plan and associated aspects of the construction. When required for a site by law, visitors and non-employees upon entering the site shall be issued with the proper Personal Protective Equipment (PPE) as and when necessary.

11.8.2 Security Arrangements

The Principal Contractor must establish site access rules and implement and maintain these throughout the construction period. Access control must include the rule that non-employees shall at all times be provided with fulltime supervision while on site. The Principal Contractor must develop a set of Security rules and procedures and maintain these throughout the construction period.

If not already tasked to the H&S Officer appointed in terms of Construction Regulation 6(6), the Principal Contractor must appoint a competent Emergency Controller who must develop contingency plans for any emergency that may arise on site as indicated by the risk assessments. These must include a monthly practice/testing programme for the plans e.g. January: trench collapse, February: flooding etc. and practiced/tested with all persons on site at the time, participating.

11.9 Training

The Principal Contractor shall ensure that all employees under his or her control are informed, instructed and trained by a competent person regarding any hazard and the related work procedures before any work commences, and thereafter at such times as may be determined in the risk assessment.

The Principal Contractor shall ensure that all labourers are informed regarding any hazard as stipulated in the risk assessment before any work commences, and thereafter at such times as may be determined in the risk assessment.

The Principal Contractor shall ensure that as far as is reasonably practicable, ergonomic are analysed, evaluated and addressed in the risk assessment.

No Principal Contractor shall allow or permit any employee to enter any site, unless such person has undergone health and safety induction training pertaining to the hazards prevalent on the site at the time of entry.

The Principal Contractor shall ensure that all visitors to a construction site undergoes health and safety instruction pertaining to the hazards prevalent on the site and shall be provided with the necessary personal and protective equipment: Provided that where visits are made only to the site office which is not in direct contact with the construction work activities, those health and safety instructions and the provision of personal protective equipment may not apply.

The contents and syllabi of all training required by the Act and Regulations including any other related

or relevant training as required must be included in the Principal Contractor's Health and Safety Plan and Health and Safety File.

11.9.1 General Induction Training

The Principal Contractor must ensure that the employees on site are conversant with the general health and safety requirements on site. All employees of the Principal and other Contractors must be in possession of proof of General Induction training

11.9.2 Site Specific Induction Training

All employees of the Principal and other Contractors must be in possession of Site Specific Occupational Health and Safety Induction or other qualifying training.

11.9.3 Other Training

All operators, drivers and users of construction vehicles, mobile plant and other equipment must be in possession of valid proof of training. All employees in jobs requiring training in terms of the Act and Regulations must be in possession of valid proof of training as follows:

- General Induction (Section 8 of the Act)
- Site/Job Specific Induction (also visitors) (Sections 8 & 9 of the Act)
- Site/Project Manager
- Construction Supervisor
- OH&S Representatives (Section 18 (3) of the Act)
- Training of the Appointees indicated in 12.6.1 & 12.6.2 above
- Operation of Cranes (Driven Machinery Regulations 18 (11)
- Operators & Drivers of Construction Vehicles & Mobile Plant (Construction Regulation 21)
- Basic Fire Prevention & Protection (Environmental Regulations 9 and Construction Regulation 27)

As a minimum basic First Aid to be upgraded when necessary (General Safety Regulations 3)

- Storekeeping Methods & Safe Stacking (Construction Regulation 26)
- Emergency, Security and Fire Co-ordinator

11.10 Accident and Incident Investigation

The Principal Contractor is responsible to oversee the investigation of all accidents/incidents where employees and non-employees were injured to the extent that he/she/they had to receive first aid or be referred for medical treatment by a doctor, hospital or clinic. (General Administrative Regulation 9).The Principal Contractor is responsible for the investigation of all non-injury incidents as described in Section 24 (1) (b) & (c) of the Act and keeping a record of the results of such investigations including the steps taken to prevent similar incidents in future. Notwithstanding the requirements of Section 24 of the Act, ALL incidents shall be investigated and reported on in writing, irrespective of whether such incident gave rise to injury or damage.

11.11 H&S Representatives and H&S Committees

11.11.1 Designation of H&S Representatives

Where the Principal Contractor employs more than 20 persons (including the employees of other Contractors (sub-contractors) he has to appoint one H&S Representatives for every 50 employees or part thereof. (Section 17 of the Act and General Administrative Regulation 6. & 7.). H&S Representatives have to be designated in writing and the designation shall be in accordance with the Collective Agreement as concluded between the parties as is required in terms of General Administration Regulation 6.

11.11.2 Duties and Functions of the H&S Representatives

The Principal Contractor must ensure that the designated H&S Representatives conduct at least a weekly inspection of their respective areas of responsibility using a checklist and report thereon to the Principal Contractor, after which these reports shall be consolidated for submission to the Health and Safety Committee. H&S Representatives must be included in and be part of accident/incident investigations. H&S Representatives shall be members of at least one H&S Committee and must attend all meetings of that H&S committee.

11.12 Establishment of H&S Committee(s)

The Principal Contractor must establish H&S Committees consisting of designated H&S Representatives together with a number of Employers Representatives appointed as per Section 19(3) that are not allowed to exceed the number of H&S Representatives on the committee. The persons nominated by the employer on a H&S Committee must be designated in writing for such period as may be determined by him. The H&S Committee shall co-opt advisory (temporary) members and determine the procedures of the meetings including the chairmanship.

12. HOUSEKEEPING

Good housekeeping will be maintained at all times as per Construction Regulation No. 25. Poor housekeeping contributes to three major problems, namely, costly or increased accidents, fire or fire hazards and reduction in production. Good housekeeping will enhance production time.

Particular emphasis is to be placed on the following crucial elements of a construction site:

- Phase priorities and production/plant layout
- Enclosures
- Pits, openings and shoring
- Storage facilities
- Effective, sufficient and maintained lighting and illumination
- Principal sources of injuries, e.g., stairways, runways, ramps, loose building material
- Oil, grease, water, waste, rubble, glass, storm water
- Colour coding
- Demarcations
- Pollution
- Waste disposal
- Ablution and hygiene facilities
- First aid disposals
- Hazardous chemical substances

This is list must not be taken to be an exclusive or exhaustive

In promotion of environmental control all waste, rubble, scrap etc., will be disposed of at a registered dumping site and records will be maintained. Where it is found to be impractical to use a registered dump site or it is not available, the Principal Contractor will ensure that the matter is brought to record with the client or his representative, after which suitable, acceptable alternatives will be sought and applied. Dross capable of fermentation, putrefaction or constituting a nuisance shall be treated or disposed of by methods approved by an inspector

13. OPERATIONAL CONTROL

The Principal Contractor shall take reasonable steps to ensure that necessary control measures are taken to promote a safe working environment during all operational works. Routine safety inspections shall be carried out to ensure plant, machinery and tools are safe enough for employees to work with. Operational control measures shall be taken for the following activities and plant or machinery where applicable:

- Fall protection;

- Excavation work;
- Scaffolding;
- Mobile plants;
- Electrical installation and machinery; and
- Other associated activities

15. OFFENCES AND PENALTIES

Any contractor who does not comply with the requirements of the Act, will be penalized or punished as per Section 38 of the Act. The Principal Contractor must also note that the Client may stop the execution of construction work if it is not in accordance with the health and safety plan or if it poses a threat on the health and safety of employees and the public.