Part C3: Scope of Work

Status

Should any requirement or provision in the parts of the Scope of Work conflict with any requirement of any Standardised Specification, particular specification or any drawings, the order of precedence, unless otherwise specified, is:

Drawings
Scope of Work (Parts C3.1, C3.4, C3.5 and C3.6)
Particular Specifications
SANS Standardised Specifications

C3.1 Description of the Works

CONTENTS

3.1.1 EMPLOYER'S OBJECTIVES

The employer's objective is to ensure public safety and to extend the service life of the concrete bridges and structures by maintaining the route's safety.

Over the years, the structural steel and aluminum hand rails had been stolen as well as the concrete elements has deteriorated, it is the employers objective that these structures be made safe for public use as well as be repaired and refurbish to extend the service life of the structural elements.

Another major consideration is the requirement of safe vehicular movement, which must be maintained throughout the repair and construction period.

3.1.2 OVERVIEW OF THE WORKS

The proposed rehabilitation of existing balustrade on Nelson Mandela Boulevard project, extends both the inbound and outbound from Cape Town CBD and would include the following sections:

The outbound would start in Cape Town CBD from the Newmarket Street on ramp, onto Nelson Mandela Boulevard. The inbound section would extend all the way down the off ramp to Strand Street into Newmarket Street and stop at the bottom of the ramp at the Goodhope Centre.

The rehabilitation to the balustrades for both the inbound and out bound would extend from the CDB all the way to the Ingrid Jonker Footbridge. This is all clearly indicated on the site plan layout, which is in Volume 4 (book of drawings) of this project document.

The existing balustrades were originally built with structural steel and aluminium hand railings. Over the year's sections of these handrails were stolen. The City has deemed it necessary to replace these missing handrails with reinforced concrete handrails as well as to rehabilitate the damaged and deteriorated reinforced concrete balustrades to create a safe environment for road users and extend the life of the balustrades.

3.1.3 EXTENT OF THE WORKS

The Project to which this Specification relates comprises the following items of work, to be carried out on the project identified in Clause 3.1 above, in accordance with the drawings and this specification and to the satisfaction of The Engineer.

The works includes the installation and usage of suitable traffic accommodation signage and procedures. Where the form and disposition of all items of signage are to be in accordance with the South African Road Traffic Signs Manual Vol 2 Chapter 13: Road works Signage (June 1999), and the corresponding regulations in the Road Traffic Act, (Act 93 of 1993) and Appendices 8 and 9 (August 1992) for dimensional and colour details. To allow for the installation of the new reinforced concrete balustrade handrails. Repairs and refurbishment to existing balustrades, retaining walls and other structural items, to be conducted safely on the sections of Nelson Mandela Boulevard. Also includes cleaning of the existing structural items, which required receiving a protective coating. Applying 2 coats of protective coating to areas specified. It is the contractor's responsibility to design and compile traffic accommodation layouts and issue them to the Engineer for approval prior to commencement of the accommodation.

3.1.3.1 INSTALLATION OF CONCRETE HAND RAILS

The scope of the work incorporated in this project consists of the following, which shall be executed in accordance with the drawings and specifications and to the satisfaction of the engineer:

a) Installation and management traffic accommodation measures to allow both the inbound and outbound side remedial operations to be completed while keeping three 2.7m (minimum) wide lanes open to traffic at all times. As well as a minimum or 2.7m wide lanes while working on the on and off ramps.

b) Work shall be performed in sections agreed by the engineer, in line with the construction program, to ensure vehicular movement is maintained at a constant flow and public safety is not comprised.

c) The removal and disposal of the remaining existing aluminum and structural steel handrails and/or embedded upstands. Structural steel rails to be taken to a City of Cape Town Depot.

d) The contractor shall accurately perform a detailed survey of the existing walls and structures and confirm this with the dimensions on the design drawings, any discrepancies to be reported to the engineer. The contractor shall also do a detailed survey measurement for the new precast handrails to determine the exact required size. Only once the dimensions and measurements are agreed and accepted by the engineer can the contractor proceed with manufacturing the precast top rail elements. The contractor would need to provide the dimensions to the Engineer soonest, such that the required reinforcing layouts can be produced and be issued for construction.

e) Drilling and grouting in hot dip galvanized anchor bar reinforcement as specified, to secure the new handrails.

f) Installation of new pre-cast concrete handrails with hot dip galvanized steel reinforcement throughout. Ensure that the new concrete handrails are aligned and straight with existing concrete parapets.

g) High pressure cleaning of the existing reinforced concrete balustrades, parapets and handrails. All blowholes, cracks and other defaults which are made apparent, must be fixed before further remedial work is conducted.

h) After a visual inspection, any necessary concrete spalling repair must be completed on the reinforced concrete balustrades, walls and parapets. As indicated by Engineer see section 3.2.2.

i) Coating of the balustrades (including the new handrails), with 2 coats Sikatop Seal 107 (or equivalent) to product specifications.

3.1.3.2 REPAIR OF CONCRETE SPALLS

a) Minor Concrete Spalls

All minor concrete spalls that are regarded as non-structural are to be repaired using the following general procedures unless otherwise instructed by the Engineer.

- Horizontal and vertical saw-cuts, 10 mm deep, to be made around the designated repair area. Attention to the quality and finishing of the saw cuts are critical.
- All delaminated or loose concrete to be removed using light hand tools to at least 25 mm depth and to provide a clear gap of at least 25 mm around any exposed reinforcing bar.
- All reinforcing with rust will be exposed to at least 50 mm beyond the corrosion has ceased along the length of the bar.
- Corroded reinforcement to be cleaned using wire brushing and immediately after cleaning apply a coat of approximately 1mm thick SIKATOP ARMATEC 110 EPOCEM anti-corrosion primer (or equivalent), to the reinforcing steel. Allow to dry for approximately 2-3 hours (at 20^{o}C) before applying a second coat of similar thickness to the reinforcing steel and surrounding concrete. Allow to dry for a similar period before applying patching mortar to the repair.
- Apply onto the bonding slurry SIKA MONOTOP 615HB (or equivalent), patching mortar of earth consistency. The MONOTOP 615 HB mortar (or an equivalent) is to be well compacted in layers not exceeding 10- 70 mm, and is to be towelled off to the profile of the surrounding concrete.
- All repairs to be cured for a minimum of 7 days after application using an approved curing system.
- Another option is using a shutter system and a pourable non-shrink grout, SIKAGROUT 212 (or an equivalent).

3.1.3.3 PROTECTIVE COATING TO CONCRETE STRUCTURES

As part of the above mentioned remedial measures a suitable protective waterproof cementitious coating will be applied to all exposed concrete parapets, balustrades and hand rails on the inside and outside surfaces. The use of SIKATOP-SEAL 107 ZA (or equivalent) will be applied to the concrete surfaces visible from the road. This coating will be applied with strict adherence to the product specifications. Preparation of this coating includes pressure hydro-jet cleaning of existing concrete surfaces.

3.1.3.4 MAINTENACE WORKS

The Contractor will be responsible for the maintenance of the site during construction and for the maintenance of the works for a period of twelve (12) months after completion of the works in accordance with Clauses 7.8 and 7.9 of the General Conditions of Contract 2010.

3.1.4 DRAWINGS

The reduced drawings in Volume 4 (Book of drawings), forming part of the tender documents, shall be used for tender purposes only.

The Contractor will be supplied with two full sized paper prints of each of the drawings. These prints will be issued free of charge and the Contractor shall make any additional prints he may require at his own cost.

Any information in the possession of the Contractor, which is necessary for the resident Engineer for completing his as-built drawings, shall be supplied to the resident Engineer before a certificate of completion will be issued.

Only figured dimensions shall be used and drawings shall not be scaled unless so instructed by the Engineer. The Engineer will supply any figured dimensions, which may have been omitted from the drawings.
The dimensions given on the drawings were based on dimensions extracted from the original construction drawings, and are subject to confirmation on the site. The Contractor shall check all dimensions given on the drawings with the as-built dimensions and shall confirm any discrepancies with the Engineer before he commences any structural construction work or ordering of reinforcement.

3.1.5 POWER SUPPLY AND OTHER SERVICES

The Contractor shall make all his own arrangements concerning the supply of electrical power and all other services required for the execution of the works. No direct payment will be made for the provision of services for construction and other purposes 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.

3.1.6 CONSTRUCTION IN CONFINED AREAS

It is necessary for the Contractor to work within an area containing high volumes of traffic travelling at high speeds. The Contractor's attention is drawn to the fact that no additional payment shall be made for this. The rates and amounts tendered shall be deemed to include full compensation for any special equipment or construction methods or for any difficulty encountered in working in this area, and at or around obstructions, and that no extra payment will be made nor will any claim for payment be considered due to these difficulties.

3.1.7 CONTRACTOR'S SITE

The Contractor may, if required, establish his camp site in a location on or near the site which shall be approved beforehand by the Engineer. It will also be compulsory for the Contractor to provide his staff with ablution facilities (i.e. in the form of portable flushable chemical toilets) for the duration of the works and the Contractor shall make provision for this in his rates.

During construction, the camp site shall be maintained in a neat and tidy condition.

On completion of the Works, the camp area is to be cleared and reinstated to its original condition; all to the satisfaction of the Engineer. Any damage to the Employer's property shall be made good to the satisfaction of the Engineer and at the Contractor's expense.

3.1.8 ACCOMMODATION FOR WORKMEN AND MATERIALS

The Contractor shall provide, erect and maintain all necessary and proper sheds and shelters for his own workmen and the workmen employed by the Sub-Contractors, and all sheds for the proper storage of plant, tackle, implements and materials including those of his Sub-Contractors if he deems it necessary to keep materials on site.

All sheds and other temporary structures, which the Contractor may erect, and the location of these structures, shall be to the approval of the Engineer.

The Contractor will not be permitted to erect living quarters for his employees at the locality of the site. This condition does not apply to employees who are employed by the Contractor for the safekeeping of his equipment and plant during off-duty hours. The Contractor shall provide these employees with suitable accommodation that shall comply with all regulations and shall be to the approval of the Engineer.

Notwithstanding the above provisions it is recommended that the contractor does not store any materials or equipment on site.

3.1.9 PRECAUTIONS AGAINST DAMAGE TO EXISTING BRIDGES OR SERVICES

The Contractor shall during the progress of the Work take every reasonable, proper, timely and useful precaution against damage to the existing structure and/or any services on or near the Contract site. The Contractor shall remain answerable and liable for all damage thereto which, until completion of the Contract, may arise from or be occasioned by the acts of the Contractor.

3.1.10 DISPOSAL OF WASTE MATERIAL

All demolished, removed or unusable material on the site must be safely stockpiled and must be disposed of away from the site (without unreasonable delay) at a spoil site to be arranged by the Contractor and at the Contractor's expense.

The roadway, sidewalk and shoulder, in particular, must not be disturbed or polluted in any way.

3.1.11 TRAFFIC ACCOMMODATION

The Contractor shall comply with the traffic accommodation requirements as detailed in The South African Road Traffic Signs Manual and Road Signs Note No.13. In addition, the Engineer may, at his own discretion, or on the advice or instruction of the Traffic Manager or his representatives, specify such additional measures as may be necessary to maintain the safe flow of traffic.

The Contractor may not commence construction activities before adequate provision has been made for accommodating traffic in accordance with the requirements of this document. A written method statement must be submitted to the Engineer at least 10 working days prior to the event taking place. In addition, the Contractor is to give notice to the Engineer and the Traffic Manager at least 24 hours in advance, who shall inspect the traffic accommodations before traffic is deviated.

The safety and convenience of the travelling public is to be considered of uttermost importance and every effort must be made to ensure that all temporary road signs, flagmen and speed controls are maintained and are effective, and that courtesy is extended to the public at all times.

Failure to maintain road signs, warning signs or flicker lights, etc, in a good condition shall constitute ample reason for the Engineer to bring the works to a stop until the road signs, etc have been repaired to his satisfaction.

The Contractor's tendered rates for the relevant items in the Bill of Quantities shall include full compensation for all possible additional costs that may arise from this, and no claims for extra payment, following on inconvenience caused by or as a result of the modus operandi to be followed, will be considered.

1.3.11.1 Working-hour classification

Interruption of the traffic flow shall be minimized and complete stoppage of the traffic will not be permitted under any circumstances. The following working-hour classification shall apply:

(a) Peak Hours		
Monday to Friday	=06:00-09:00	**morning peak**
	=15:00-19:00	**evening peak**
Any weekdays before school or public Holidays or potential long weekends	=12:00-19:00	
(b) Night time hours		
All week	=20:00-04:00	

The Engineer may vary the hours associated with each classification should circumstances so dictate.

1.3.11.2 Night time work

It is not envisaged that any of the work to be undertaken on this contract be done at night. The Engineer's written approval must be obtained prior to any night work.

1.2.11.3 Non-working time

The following weekend and weekday event shall be regarded as non-working and no work shall be planned for these:

(a) Easter weekend from 12:00 on the Thursday to 09:30 on the following Tuesday.

The Contractor shall confirm the above events and associated traffic management arrangements together with Chris Atkins (tel 021 400 2286) from the City of Cape Town.

3.1.12 SAFETY OFFICER

At the commencement of the contract the Contractor is required to appoint a safety officer. The safety officer shall be responsible for ensuring that all safety and traffic-related matters are monitored and controlled, and that all identified problems or defects are immediately rectified.

3.1.13 SITE SECURITY

The contractor shall carefully assess the security measures of whatever nature that may be required at the location of the site offices and the works. No direct payment for security measures shall be made and the contractor shall make adequate provision in his tendered rates for all measures. Including insurance, deemed necessary by him to safeguard his staff and that of the engineer, his plant, materials and equipment. As well as to prevent disruption of the works by criminals. No claims in this regard will be entertained.

3.1.14 EXISTING FACILITIES

Prior to commencing work, the Contractor shall confer with all Authorities and Departments concerned and obtain the necessary wayleaves. For services affected by the Works and shall satisfy himself that he has obtained all the relevant information required to complete the Contract. 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:

(i) 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.

(ii) 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 Services

Services and sub-surface obstructions likely to be affected by the work, based on available records and surveys, have been shown on drawings and or photographs. Although every care has been exercised in the presentation of the available data, the Employer cannot and does not vouch for the accuracy and 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 were carried out him or by or on behalf of the service authority or department concerned.

As soon as an underground service not shown on the drawings 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.

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.

The covers and frames of service manholes, catchpits, watermains, valve boxes and sewers will have to be adjusted where they are affected by the works.

(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) meters 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 proximity of ESKOM and the other electrical services:

<u>MACHINERY AND OCCUPATIONAL SAFETY ACT (Act No 6 of 1983) WITH REGULATIONS</u>

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.

<u>THE ELECTRICITY ACT (Act No 40 of 1958)</u>

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 R1000.00 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 Schedule of Quantities, will be paid for under dayworks if required.

On completion of all work requiring occupation of the roadway, the sidewalks and the storm water system shall be reinstated to the satisfaction of the Engineer and the Transport for Cape Town Administration.

3.1.15 QUALITY AND PROCESS CONTROL

In addition to the quality specifications, standard of workmanship and process control requirements already contained in the standard and project specifications, it will be a definite requirement that the Contractor shall employ suitably experienced and knowledgeable personnel and shall make use of plant and equipment which is in sound working order so as to ensure an end product of consistent and high quality.

Consequently it will be incumbent on the Contractor to have the necessary expertise at his disposal and for his senior management to be actively involved in the contract especially during the period of structural steel preparation and painting.

3.1.16 SUPERVISION AND INSPECTION BY AUTHORISED OFFICIALS

The Contractor shall allow for the provision of adequate and safe means of access to facilitate the proper supervision and inspection of the Works by the Engineer's representative, and such inspections as may be required to be made by representatives of any Council Departments in the course of their duties in connection with the Works.

C3.2 Engineering / Design

CONTENTS

1. DRAWINGS ISSUED WITH THIS DOCUMENT

The following drawings are applicable to the contract and are issued with this tender document and will form part of the Contract Documents as **Volume 4 (Book of Drawings)**.

C3.3 Procurement

CONTENTS

3.3.1. PREFERENTIAL PROCUREMENT

The Works shall be executed in accordance with the conditions associated with the granting of preferences detailed in the **Preference Schedule** where preferences are granted in respect of B-BBEE contribution.

Financial penalties, as described in the **Preference Schedule**, shall be applied in the event that the Contractor is found to have breached and of the conditions contained in the **Preference Schedule** (unless proven to be beyond the control of the Contractor).

Notwithstanding the application of penalties, the Contractor's attention is drawn to other sanctions that may be applied by the Employer (listed in the **Preference Schedule**) with due consideration to the circumstances.

3.3.2. SUB-CONTRACTING PROCEDURES

3.3.2.1 Monitoring the use of sub-contractors

Notwithstanding the restriction on sub-contracting as described on the **Preference Schedule**, it is recognised that sub-contracting is an integral part of construction, which the conditions of contract make provision for.

In order, however, to comply with the requirements of the **Preference Schedule**, the Contractor shall submit to the Employer's Agent, on a monthly basis, a **B-BBEE Sub-contract Expenditure Report**. The format of this report is provided in Annex 2 attached.

The Contractor shall submit to the Employer's Agent documentary evidence in accordance with the applicable codes of good practise, , of the B-BBEE status level of every sub-contractor employed by the Contractor. Until such time as documentary evidence as described above has been submitted to the Employer's Agent, a sub-contractor shall be deemed to be a non-compliant contributor.

The Contractor shall furthermore, on the written request of the Employer's Agent, provide documentary evidence showing the value of work sub-contracted to any or all of the sub-contractors employed by the Contractor.

3.3.2.2 Procedure for the selection of sub-contractors/suppliers

Where monetary allowances for provisional sums or prime costs items have been provided in the Bills of Quantities, and where the work or items to which the allowances relate are to be executed/supplied by sub-contractors/suppliers, then the following selection process shall be followed in respect of the required sub-contractors/suppliers:

Where the monetary allowance is less than or equal to R300 000, the Contractor shall invite three quotations from suitably qualified sub-contractors/suppliers for the required work or items. The selection of the three sub-contractors/suppliers shall be in consultation with, and to the approval of the Employer's Agent. The evaluation of the quotations received must include a preference points system as described in C.3.11 of the Tender Data.

Where the monetary allowance is in excess of R300 000, an open competitive tender process shall be followed in respect of the selection of a sub-contractor/supplier for the required work or items. In such circumstances, tender documentation will be prepared by the Employer's Agent in consultation with and to the approval of the Contractor, invitations to tender will be advertised in the media by the Employer's Agent on behalf of the Contractor, and a sub-contractor/supplier will be selected from the responses received, by the Contractor and Employer's Agent in consultation. The evaluation of the offers received must include a preference points system as described in C.3.11 of the Tender Data. The Contractor must satisfy itself that the selected sub-contractor/supplier can meet the requirements of the sub-contract /supply agreement and may, on reasonable grounds, elect not to employ a particular sub-contractor/supplier.

In both instances above (less than or equal to R300 000 or in excess of R300 000), the contractual relationship between the Contractor and sub-contractor/supplier shall be as described in the conditions of contract.

C3.4 Construction

CONTENTS

3.4.1. TRADE NAMES OR PROPRIETARY PRODUCTS

Bid specifications may not make any reference to any particular trade mark, name, patent, design, type, specific origin or producer, unless there is no other sufficiently precise or intelligible way of describing the characteristics of the work, in which case such reference must be accompanied by the words “or equivalent”.

TENDERERS MUST NOTE THAT WHEREVER THIS DOCUMENT REFERS TO ANY PARTICULAR TRADE MARK, NAME, PATENT, DESIGN, TYPE, SPECIFIC ORIGIN OR PRODUCER, SUCH REFERENCE SHALL BE DEEMED TO BE ACCOMPANIED BY THE WORDS ‘OR EQUIVALENT”

3.4.2 APPLICABLE STANDARDISED SPECIFICATIONS

The following specifications, as listed below, are relevant and shall apply to this contract:

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.

The tenderer shall obtain / purchase it 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 document may also be inspected, by appointment, at the offices of the employer and the consulting engineers during normal office hours.

3.4.3 PARTICULAR / PROJECT SPECIFIC SPECIFICATIONS

Amendments to the standard specifications are included in this Part B: 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.

In addition the following particular specifications shall also apply to this contract:

- Specifications for environmental management bound in Section C3.5 in E : Environmental Specifications
- Specifications for health and safety bound in Section 3.5 in H : Health and Safety Specifications

SECTION B1100 : DEFINITIONS AND TERMS

B1115 GENERAL CONDITIONS OF CONTRACT

Replace Clause 1115 with the following:

The 2010 edition of the General Conditions of Contract for Construction Works 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 2010	
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.	5.12	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%
1303	1300-2	12	Payment Item 13.01 (c)	5.3	Commencement of the Works

COLTO Standard Specification		COLTO General Conditions of Contract 1998 (GCC)		SAICE General Conditions of Contract for Construction Works 2nd edition 2010	
Clause No	Page No	Clause No	Description or Reference	Clause No	Description or Reference
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	6.4.1	Variation for rented accommodation
1505	1500-3	40 (1)	Variation for temporary drainage	6.4.1	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	6.4	Payment for prospecting for materials
3204(b) (iii)	3200-2	40	Payment for oversize material	6.4	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	6.6	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 (Second Edition) 2010 shall apply to the contract with the following reference to the terms used in the COLTO Standard Specifications:

SAICE General Conditions of Contract 2010: Sub clause 1.1.1 Definitions

Replace Sub clause 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 Sub clause 1.1.1.8 with the following:

"1.1.1.8 "**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 Sub clause 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 Sub clause 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:

"1.1.1.35 "**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."

"1.1.1.36 "**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."

"1.1.1.37 "**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."

SECTION B1200 : GENERAL REQUIREMENTS AND PROVISIONS

B1202 SERVICES

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 Services

Services and sub-surface obstructions likely to be affected by the work, based on available records and surveys, have been shown on drawings and or photographs. Although every care has been exercised in the presentation of the available data, the Employer cannot and does not vouch for the accuracy and 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 were carried out him or by or on behalf of the service authority or department concerned.

As soon as an underground service not shown on the drawings 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, water mains, sewers and storm water 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.

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, water main valve covers and manholes shall be kept unobstructed and accessible at all times.

The covers and frames of service manholes catch pits, water mains, valve boxes and sewers will have to be adjusted where they are affected by the works.

(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) meters 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 proximity of ESKOM and the 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 R1000.00 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 Schedule of Quantities, will be paid for under day works if required.

On completion of all work requiring occupation of the roadway, the sidewalks and the storm water system shall be reinstated to the satisfaction of the Engineer and the Roads & Storm water department of the Cape Town Administration.

B1204 PROGRAMME OF WORK

(a) General requirements

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

I. All special non-working days defined in Conditions of Tender.

II. The expected delays defined in B1215: Extension of time resulting from inclement weather.

This initial programme shall realistically account for the forecast cashflow within the defined contract period, and as provided on Schedule of estimated monthly expenditure."

(b) Programme of work for rehabilitation work

"The programme 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."

"(c) Programme revisions

The programme will be reviewed at the fortnightly site meetings at which the contractor shall provide sufficient detail that will allow the comparison of completed work per activity against the original approved 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 approval within seven days of the demand."

B1205 WORKMANSHIP AND QUALITY CONTROL

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.

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.

B1207 NOTICES, SIGNS AND ADVERTISEMENTS

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 13.01 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

(g) 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.

(h) Trade names

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

(i) Value Added Tax (VAT)

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

B1215 EXTENSION OF TIME RESULTING FROM ABNORMAL RAINFALL

Delete the entire clause and replace with the following:

This clause shall be deemed to determine extension of time due to adverse effects of any abnormal climatic conditions, including rainfall and wind. The Contractor shall make allowance in his rates and

programme for the anticipated days lost due to normal climatic conditions, including rain and wind, as set out in Table B1215/1.
For the purposes of calculating an extension of time due to climatic conditions in terms of clause 5.12.2 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	2	July	4
February	2	August	4
March	2	September	4
April	2	October	2
May	2	November	2
June	4	December	2

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 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.

B1219 WATER

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

B1229 SABS CEMENT SPECIFICATIONS

Any cement used during construction shall comply with SANS 50197-1 for common cements and SANS 50413-1 (2005) for masonry cement. Any reference to SABS EN 197-1 in the standard specifications shall be replaced with SANS 50197-1.

Where the old SABS 471 product nomenclature has been used in the standard specifications, the Contractor shall supply and use the relevant new product, in compliance with SANS 50197-1.

Cement Grade	*Cement Type*	*Approximate old product name*	*New Alpha*	*New Blue Circle*	*New NPC*	*New PPC*	*New Slagment*
52.5	*CEM I*	*Rapid hardening*	*Rapid Hard*	*Duracast*	*Eagle Super*	-	-
42.5R	*CEM I*	*Rapid hardening*	-	-	-	*Rapo*	-
42.5	*CEM I*	*OPC**	*Portland cement*	*Duratech*	-	*OPC*	-

Cement Grade	Cement Type	Approximate old product name	New Alpha	New Blue Circle	New NPC	New PPC	New Slagment
	CEM I	LASRC	-	-	-	LASRC	-
	CEM II A-S	PC 15SL	-	-	Eagle Plus	-	-
	CEM II B-S	RH30SL	-	-	Eagle Plus	-	-
32.5R	-	-	-	-	-	-	-
32.5	CEM II A-V	PC 15FA	All Purpose Cement	-	-	Surebuild	-
	CEM II A-W	PC15FA	-	-	-	Surebuild	-
	CEM II A-L	-	All purpose Cement	-	-	Surebuild	-
	CEM II B-V or W	PC25FA/PFAC**	-	Structrete	-	Surecrete	-
	CEM IIIA	PBFC	-	BFC	Eagle Pro	-	PBFC
	CEM IIIA	RHSL	-	-	-	-	RHSL
22.5	MC 22.5X	PFAC***	Multi Purpose Cement	Durabuild	-	-	-
	MC22.5X	PFAC***	-	Buildcrete	-	-	-
12.5	MC 12.5	Walcrete	Mortar Cement	Wallcrete	-	Masonry	-
	MC 12.5	Mortacem	-	-	-	-	-

Notes: * *OPC cements previously performed approximately as CEM 1 32,5R products*

** *PC25FA cements under the old standards achieved lower compressive strengths than the OPC's of the time*

*** *Some PFAC cements meet the new standard for MC 22,5X. Others required modification before meeting the requirements for MC 22,5X*

The following new clauses shall be added after Clause 1229 of the Specifications:

B1230 MATERIALS

The Contractor, when using materials that are required to comply with any standard specification, shall, if so ordered, furnish the Engineer with certificates showing that the materials do so comply. Where so specified, materials shall bear the official mark of the appropriate authority. Samples ordered or specified shall be delivered to the Engineer's office on the Site free of charge.

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 (i.e. new).

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.

(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.

B1231 ENVIRONMENTAL IMPACT CONTROL

(a) General

In addition to aspects of design which are intended to avoid or reduce environmental impact, and also in addition to normal good construction practices expected of the contractor, the requirements of the Environmental Management Plan (Part C of this document) shall be strictly followed. Unless otherwise specified, no separate payment will be made for observing these requirements as it shall be included in the amount tendered for items 13.01(a), (b) and (c). Any non-compliance with these requirements which in the opinion of the engineer could have been avoided may be considered sufficient grounds for applying the penalty as to be determined in accordance to C1005.

(b) Method statements

The contractor shall be required to submit method statements to the engineer detailing his construction activities and what measures will be implemented to prevent the pollution of the environment through the spilling of concrete, fuels, bituminous binders, sewage from the temporary toilets and other deleterious materials.

(c) Toilets

A minimum of one toilet shall be provided per 15 employees and they shall be positioned such that at no time a toilet is more than 300 m away from the furthest worker.

B1232 HEALTH AND 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 H of C3.5 Management Specifications) and observe all laws, ordinances and regulations pertaining to his work.

In terms of Clause 4.3.1 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 there under.

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.

For this project the following hazardous and safety risks are of particular significance:

- Construction work is to be carried out over a road under live traffic conditions. The accommodation of traffic, maintenance of safety barriers, visibility of workers, arrangements regarding the crossing of the roadway on foot and traffic awareness safety training of workers shall receive priority attention at all times.
- Movement of site personnel, plant and materials between various parts of the construction site and the need to cross live traffic to access certain work areas.
- The possibility of early morning mists or rainfall adversely affecting visibility.

The above circumstances are likely to exacerbate problems related to excessive speeding of traffic through the works.

The contractor must take note of these restraints in the preparation of the documented health and safety plan, and risk assessments applicable to the various operations.

B1233 MEASUREMENT AND PAYMENT

Add the following new payment items:

Items	**Unit**
B12.01 Protection of existing services	

(a) Protection and handling of services in the footways.....provisional sum

(b) Handling cost and profit in respect of subitem 12.01 (b).....percentage (%)

The tendered percentage shall include full compensation for all handling costs, including profit, for any services within the footways (which, for the sake of tendering, shall be assumed to consist of street lighting cables and Telkom optic fibre cables).

SECTION B1300: CONTRACTOR'S ESTABLISHMENT ON SITE AND GENERAL OBLIGATIONS

B 1302 GENERAL REQUIREMENTS

(a) Camps, construction plant and testing facilities

Add the following after the first paragraph of sub clause 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.

The following new sub items shall be added after sub clause 1302(c) of the Specifications:

(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.

(f) Sanitation

The Contractor shall provide at each work site 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 7.3 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.

B 1303 PAYMENT

Item **Unit**

Item B 13.01 The Contractor's general obligations

In the second sentence of the fourth last paragraph replace "from the date on which the Contractor has received the Letter of Acceptance" *with* "from the Commencement Date".

*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) represents full compensation for that part of the contractor's general obligations which are mainly a function of construction time. The tendered rate will be paid monthly, pro rata for parts of a month, from the commencement date (as defined in the special conditions of contract clause 1(1)), until the end of the time for completion of the works, plus any extension thereof as provided in clause 6.6 of the general conditions of contract, provided that –"

Add the following after paragraph (b):

"(c) Should the contractor fail to meet its obligations in terms of clauses B1204, B1230 and B1231 of these specifications, the engineer, at his sole discretion, may withhold all or part of the payment due in terms of this clause."

Add the following at the end of this pay item:

"The amount payable to the contractor for time related costs arising from extension of time granted by the employer, where the contractor is fairly entitled to such compensation in terms of clause 42.4 of the general conditions of contract, shall be calculated as follows:

(i) Account shall be taken of all time related items scheduled in Section 1300, 1400 and 1500.
(ii) Payment will be made only for items for which the unit of measurement is "month"."

"Item **Unit**

B13.02 Provisional sums

(a) Provisional sum allowed for the protection, relocation or reinstatement of existing services.....provisional sum
(b) Handling costs and profit in respect of subitem B13.02(a) .....percentage (%)
(c) Provisional sum allowed for provision of other traffic control measures …….provisional sum
(d) Handling costs and profit in respect of subitem B13.02(c) .....percentage (%)
(e) Provisional sum allowed for fixing removed aluminum handrails at other road bridges ……..provisional sum
(f) Handling costs and profit in respect of subitem B13.02(e) .....percentage (%)

The provisional sums allowed shall be controlled and expended as stipulated in clause 48 of the general conditions of contract.

The provisional sum allowed under subitem (a) shall be expended to cover the costs of the protection, relocation and/or reinstatement of existing services by the contractor in accordance with the general conditions of contract. Only items of work ordered by the engineer for which there is no applicable measurement and payment item in the schedule of quantities will be measured and paid for under this item.

The provisional sum allowed under subitem (c) shall be expended to cover the costs of any additional traffic control measures undertaken by the contractor in accordance with the general conditions of contract. Only items of work ordered by the engineer for which there is no applicable measurement and payment item in the schedule of quantities will be measured and paid for under this item.

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 contractor shall prepare and submit accommodation of traffic layouts to the engineer, for comment/approval at least 7 days prior to the scheduled commissioning of the traffic accommodation."

B 1502 GENERAL REQUIREMENTS

(a) Safety

The following shall be added to Clause 1502(a) of the Specifications:

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."

(f) Approval of temporary deviations

If, after any temporary deviation has been constructed, any changes are considered necessary or desirable, the proposal shall be submitted to the Engineer for his approval.

(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, TSO. The level of responsibility and detailed record keeping required of the TSO demands that the proposed TSO should be an academically competent person with at least matric, the ability to communicate fluently and clearly in English and/or Afrikaans, and have at least five years practical site experience in accommodation of traffic and traffic safety matters."

- Insert the following as the opening phrase to subclause (i):

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

Delete subclauses (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 flagmen 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 09h30 and at 16h30, 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 flagmen, STOP/GO and traffic signal control men employed."

Add the following new sub clauses:

(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 3 tons 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 150 mm high, and the sign shall be mounted on the vehicle at least 1,5 m 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 flagmen 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 B15.15.

(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, flagmen and any other devices used for traffic accommodation.

(xiii) Escort delivery vehicles and other plant into and out of the site in accordance with the procedures instructed by the engineer.

Add the following new sub clauses to Clause 1502 of the Specifications:

(j) Safety jackets

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). 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.

(k) Traffic diversions
Add the following:

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.

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 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.

(l) 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 flagmen 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.

(m) Staging of construction

The work in this Contract will necessitate traffic having to be deviated onto a reduced -width carriageway and chanellised into traffic lanes routed past / through the construction work areas.

Traffic shall be accommodated on the existing surfaced carriageway and shoulders. No temporary deviations are envisaged at road junctions / intersections under this contract. Accommodation of traffic will generally be carried out by partially closing off some of the lanes but ensuring that there is a continuous flow of traffic.

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 on drawings.

(ii) A minimum single trafficable width of 2.7m on all roads shall be maintained.

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

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

(v) 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.

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

(vii) Before re-opening a lane to traffic after milling/surfacing operations, 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.

Whenever possible, the Contractor shall ensure that the full road width or carriageway shall be open at night and all signs no longer applicable to the situation removed or effectively covered. If the road or carriageway is not in a safe trafficable condition over the full width at the end of each day's work, the Contractor shall provide adequate flagmen, 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.

(n) 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 R5000,00 per occurrence 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 hour 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.

(o) 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 B15.16.

(n) Use of the road by the public

The travelling public shall have the right of way on public roads, and the contractor shall apply suitable approved methods for controlling the movement of his equipment and vehicles such that they do not constitute a hazard on the road.

In all dealings with the public the contractor shall bear in mind the public's right to enjoy the use of the road, and the employer's desire to interfere as little as possible with this right. At all times during the course of the contract, the contractor shall whenever dealing with the public behave in a courteous and understanding manner.

The contractor shall on a continual basis, and at least one week prior to a major event, inform the general public of the intended road works, construction period and accommodation of traffic arrangements through press releases in local and provincial newspapers and via local radio channels.

B 1503 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."

(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 item B15.01."

(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 200 mm x 800 mm 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 60 km/h in typical working conditions without falling over. To achieve this, the base shall be at least 0,18 m^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 for other short-term lane deviations during daylight. Cones used on deviations shall be 750 mm high on Trunk Roads and 450 mm high on other roads with suitable heavy bases to prevent the cones from being blown over by wind or turbulence from moving traffic.

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) Flagmen

Flagmen shall be provided where shown on the drawings or required by the specification. Where the shoulder of the road is closed to traffic, a flagman shall be provided at the leading end of the closure during daytime. This flagman shall be provided at the 40-km/h sign to warn the traffic about the closure. No flagman shall be on duty for a period of more than 10 hours per day.

Flagmen 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.

Flagmen 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 600 mm. The flag shall be attached to a staff at least 1,0 m in length.

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

(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."

B 1517 MEASUREMENT AND PAYMENT

Amend item 15.01 to read as follows:

Item **Unit**

B15.01 Accommodating traffic and maintaining temporary deviations…….....….kilometre (km)

Replace the first paragraph with the following:

The unit of measurement shall be the kilometre, measured along the centre-line of the existing road, where work is carried out. Accommodation of traffic shall be measured once only, that is no separate payments shall be made for each work activity such as lane and shoulder rehabilitation, slurry, reseal, asphalt overlay, side drains, etc.

In the second paragraph, change the comma after "deviation" *at the start of the third line and delete the remainder of this first sentence. Also delete the entire second sentence, which refers to compensation for the traffic safety officer.*

In the third paragraph second sentence, insert a full stop after "use" *and delete the remainder of the sentence.*

Item 15.03 Temporary traffic-control facilities

Replace subitem (a) with the following:

Item		**Unit**
(a)	3 Flagmen ……..	man-day

The unit of measurement shall be a full day and night worked by flagmen. A man-day shall be deemed to comprise three eight hour shifts in a twenty-four-hour period. Three shifts of eight hours per flagman equates to one man-day. Shorter single portion shifts (6 to 10 hours) shall be measured as a half man-day, to be approved by Engineer.

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

Item		**Unit**
(g)	Road signs, STW-, DTG-, TGS-, and TG- series …….. (excluding delineators and barricades)	square metre (m²)
(h)	Delineators, TW-series (size and type indicated) …….	number (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 sand bags per delineator to hold it in position and for their replacement when necessary.

Replace subitem (l) with the following:
(l) The unit of measurement shall be number of each type of movable barriers. And shall include the initial erection and set up on site as well as every other setup required to be used on site for the various sections, for the full duration of the project as needed to complete the works.

Add the following new sub-items:

Item **Unit**

(n) Other traffic control measures ordered by the Engineer:

(i) Provision of other traffic control measures .....…….Provisional sum

(ii) Handling costs and profit in respect of subitem B15.03 (n)(i).....…….percentage (%)

Expenditure under this item shall be made in accordance with the general conditions of contract, Subclause 45.1, for the supply and installation of any additional signs, all other traffic control measure ordered by the Engineer in accordance with clause B1503(n) 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 of 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 this 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 traveled way when work is not in progress on that part of the section that is closed, or vice versa.

Add the following new pay item:

Item **Unit**

B15.15 Traffic safety officer .....…weeks

The unit of measurement shall be the period in calendar days that the approved traffic safety officer(s), including their vehicles, equipment and personnel, are operative on accommodation of traffic and on which satisfactory duties and reports are completed as specified.

The tendered rate per month shall include full compensation for the cost of the traffic safety officer(s), their vehicles, equipment and personnel, to conduct their duties as specified in subclauses B1502(i).

B15.16 Penalties

(a) Fixed penalty per occurrence ..... number (No)
(b) Time related penalty ..... hour (h)

In sub item B15.16(a) a fixed penalty of R5 000.00 per occurrence 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, in sub item B15.16 (b), a time-related penalty of R500.00 per hour over and above the fixed penalty in sub-item B15.16 (a) shall be deducted for non-compliance to rectify any defects in the accommodation of traffic within reasonable time after the engineer has given an instruction to this effect. The engineer's instruction shall state the time in hours for re-instatement of the defects. Should the contractor fail to adhere to the instruction, the time-related penalty will be applied from the time the

instruction was given."

NOTE:
Tenderers must note that the quantities of temporary traffic-control facilities, traffic safety officer(s) and other facilities shown in the schedule of quantities are based on the Engineer's preliminary construction programme. If a tenderer intends working at more work sections than indicated in the above programme, additional quantities of temporary traffic-control facilities will be required. The tenderer must submit a cost of the additional traffic accommodation measures with his tender. This additional cost will be added to the tender sum when evaluating the tender.

SECTION 6300: STEEL REINFORCEMENT FOR STRUCTURES

B6306 PLACING AND FIXING

Replace the second and third paragraphs with the following:

"The concrete cover for all structural concrete shall be within the acceptance ranges shown in Table B6404/3. Prior to fixing the steel, samples of the proposed spacers shall be submitted to the engineer along with a written statement for in-situ manufacture, if applicable, for approval.

Overlap of steel reinforcement bars shall be such that the cover to the lapped bars remains constant at the specified cover."

B6307 COVER AND SUPPORT

Add the following to the end of the fifth paragraph:

"Concrete cover blocks shall be made using the same cement and aggregate type as the main concrete with the same water/ cement ratio so that differences in shrinkage, thermal movements and strain are minimised."

Replace item 3.1 in Table 6306/1 with the following:

"Structures in a location within 5 km of the sea shore or anywhere up river valleys and estuaries up to 15 km of coast or locations subject to prevailing winds carrying significant chlorides "

B 6310 MEASUREMENT AND PAYMENT

Add the following at the end of clause 6416:

Item *Unit*

B63.01 Steel reinforcement for :

Add the following sub-item:

(f) Extra-over item 63.01 (e) for galvanizing of reinforcement ..... ton (t)

The unit of measurement shall be the ton of reinforcing steel hot-dip galvanized with an 85 micrometre coating in accordance with the detail on the drawings, SABS ISO 1461, and the standard specifications, clause 6705 (m) (iii).

The tendered rate shall include full compensation for all materials, tools and equipment required to galvanize the specific bars of steel as required as well as transporting and handling costs.

SECTION B6400: CONCRETE FOR STRUCTURES

B6402 MATERIALS

(a) Cement

"The use of Portland blast-furnace cement will not be permitted. Cements other than Portland cement or rapid-hardening Portland cement complying with the requirements of SABS ENV 197-1, shall only be used with the written approval of the Engineer.
Test certificates from an approved laboratory shall be furnished by the Contractor for all cements prior to their use in the works, indicating the alkalinity of the cement expressed as the percentage sodium oxide equivalent (% Na2O + 0,658 x % Ka2O). Cements with such alkalinity content in excess of 0,60% shall only be used with the written approval of the Engineer regardless of whether or not the aggregates are considered to be potentially alkali reactive, taking into account the adoption of the new SANS EN 197-1 code for cements:"

"The type of cement to be used in any concrete element shall take into account the environmental conditions and durability requirements at the location of the site of the works and shall be selected according to Table B6402/1.

Table B6402/1 : SELECTION OF CEMENT TYPE

Condition of Exposure	Placing Temperature of Concrete	Type of Cement*
1. VERY SEVERE Concrete surfaces exposed to aggressive water, sea-water spray or a saline atmosphere	< 20ºC	CEM II B – S 42.5 CEM III A CEM II B – V 32.5
	20ºC - 30ºC	CEM II B – S CEM III A CEM II B – V

Notes*

1. CEM I cements shall only be used in environments where concrete is not prone to chloride attack
2. Where a strength class of 42,5 or greater is required, and the placing temperature of concrete is between 20ºC to 30ºC, a set and hydration retarding admixture shall be used where required so as not to exacerbate bleeding.

Cement types CEM I, II and III may be blended, provided that the final product conforms to the requirements of SANS EN 197-1 for the proportion of extender used and provided that the proportion of extender in the original unblended cement is known."

(b) Aggregates

(b) Aggregates

Add the following to clause 6402(b)(i) of the Specifications:

"Test certificates from an approved laboratory shall be furnished by the Contractor for all aggregates prior to their use in the works, indicating the actual shrinkage characteristics of the aggregates."

Add the following to clause 6402(b)(iv) of the Specifications:

The following aggregates may only be used when the allowable equivalent alkali content of the concrete in kg/m3 of concrete is not exceeded.

The allowable equivalent alkali content is listed below in brackets together with the relevant aggregate. The actual equivalent alkali content shall be calculated as follows:

A = (N/100) x c

where

A = alkali content of concrete, kg/m3

N = % Na20 equivalent of cement = % Na20 + (0,658 x % K20)

c = cement content of concrete, kg/m3

Witwatersrand Supergroup (Witwatersrand)

Quartzite (2,40 kg Na20 eq/m3)

Malmesbury Group (SW Cape)

Greywacke, hornfels (shale), phyllite, sandstone, lava (2,10 kg Na20 eq/m3)

Cape Supergroup (SW Cape, E Cape, S Cape)

Orthoquartzite of the Table Mountain Group

Arkose of the Bokkeveld Group (2,80 kg Na20 eq/m3)

Karoo Sequence (Natal)

Tillite of the Dwyka Formation (3,90 kg Na20 eq/m3)

Quaternary Period (SW Cape)

Quartzitic river gravels (2,80 kg Na20 eq/m3)

The aggregate used in all concrete for this Contract shall be from approved sources known to produce aggregates with low shrinkage and low water demand characteristics.

Test certificates from an approved laboratory shall be furnished by the Contractor for all aggregates prior to their use in the works, indicating the actual shrinkage characteristics and the potential alkali reactivity of the aggregates in accordance with clause 8105(f).

Should the Contractor elect to use the above aggregates he shall comply with the following requirements regarding the cement:

(a) Before commencing any particular sections of the structure, the Contractor shall ensure that he has enough suitable cement complying with the above requirements to complete the section.
(b) Certificates stating the alkali content of each delivery of cement to the Site shall be supplied by the Contractor. These certificates shall be based on tests carried out at a laboratory approved by the Engineer. The cost of testing, including sampling, transporting of samples, and issuing of certificates, shall be borne by the Contractor.

(c) The Contractor shall be entitled to use an approved brand of cement as a means for ensuring that the permissible alkali content is not exceeded. The Contractor shall make allowance for the higher price of such approved brand, if he chooses to use this method.

"(vi) The maximum chloride ion content of fine aggregate shall be 0,2% by mass of aggregate as measured by SANS Method 830."

(e) Add mixtures

Add the following subsubclauses:

"(v) Admixtures, which have a retarding effect on the rate of hydration of the cement, may not be used when the concrete temperature is below 20º C.

(vi) A retarding admixture shall be used if temperatures of concrete mixes using cements of strength class 42.5R or 42.5 are between 20 to 30º C or where the ambient temperature is between 20 to 30º C."

B6404 CONCRETE QUALITY

(e) Bleeding

Replace the existing paragraph with the following:

"The concrete shall be so proportioned with suitable materials that total bleeding does not exceed 0,3mm/cm² as measured by ASTM C232-92."

Add the following subclause:

"B6404 (h) Protective Coatings for Concrete

This section shall cover the treatment of the exposed faces of the concrete abutments with a protective silane coating.

The following are acceptable propriety silane sealers:

(i) Sikaguard 706 Thixo silane creme
(ii) Dow Corning Z6688 silane crème (ABE supplier)

All concrete surfaces that are to receive protective coatings shall be prepared strictly in accordance with the material supplier's instructions. The preparation shall include for everything that is necessary to prepare the surface to receive the protective coatings. The contractor shall allow a minimum period of 48 days, from when the formwork to the structure is removed, to the application of the protective coating.

The contractor shall ensure that technical representatives, appointed or employed by the materials suppliers, carry out regular inspections of the preparation work and provide written confirmation that the work is in accordance with the material supplier's requirements. The reports shall be specific and definitive, generalised statements will not be acceptable. Where surface preparation is found by the technical representatives to be inadequate the report shall contain specific advice to enable the contractor to attain a required standard. The contractor shall provide the engineer with copies of all technical inspection reports before any surface treatment or protective coatings is applied to a bridge element.

Where the time between surface preparation and treatment exceeds two days and / or during windy and / or wet weather the prepared surfaces shall be re-inspected and approved by the technical representative."

Add the following subclause:

"B6404 (i) Concrete Durability

Concrete shall, in addition to the requirements of subclause 6404 (b) comply with concrete cover acceptance ranges. Concrete cover is a dimensional indicator of cover concrete depth and it varies according to the requirements of the different environmental exposure classes. When tested in accordance with the test protocols described in B8106, the concrete cover shall meet the limits listed in Table B6404/2.

Table B6404/3 CONCRETE COVER ACCEPTANCE RANGES

Test No.	Description of Test	Specified Cover (mm)	Acceptance Range*			
			Minimum		Maximum	
			Overall	Individual bar	Overall	Individual bar
B8106(g)	Concrete cover to reinforcement (mm)	20 to 80	75% of specified cover	60% of specified cover	Greater than specified cover up to limit specified by engineer	Greater than specified cover up to limit specified by engineer

Note* The design of reinforced concrete members shall be based on the maximum permissible cover especially for members less than 200mm in thickness."

B6408 CONSTRUCTION JOINTS

(a) General

Add the following:

"No construction joints other than those indicated on the drawings will 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."

B6409 CURING AND PROTECTION

Add the following to the end of subclause 6409(f):

Where curing by retention of formwork is used as the only method of curing the concrete, it must be left in place for the minimum period specified in Table 6206/1 but in no instance shall it be less than 7 days.

The materials used for formwork shall take into account properties such as thermal insulation and moisture absorption when assessing the suitability of the material, to the approval of the Engineer.

If impermeable curing membranes are to be used as a curing method, they shall be installed at the same time as formwork is removed and no portion of a concrete surface may be left unprotected for a period in excess of 2 hours. If the surface is an unformed finish e.g. top of deck slab, then the surface must be protected immediately by appropriate methods approved by the Engineer after it is finished, without damage to that surface, since it is vulnerable to plastic shrinkage cracking due to high rates of evaporation while the concrete is still in a plastic state. Plastic shrinkage and settlement shall not be permitted on any of the structural elements since it compromises the durability of the concrete.

B6410 ADVERSE WEATHER

Add the following subclause:

"(d) Temperature and Hydration of Concrete

The temperature of concrete delivered to site shall be within the range 10º C to 30º C. Concrete which has a temperature outside of this range shall not be placed in the structure.

The rate of hydration of the cement in the concrete shall be such that the concrete can be placed and properly compacted within 2 hours after the addition of water to the mix ingredients. The initial set of the concrete shall not be unduly delayed due to inappropriateness of admixtures or cement type, which could promote bleeding."

B6413 PRECAST CONCRETE

Add the following new final paragraph at the end of clause 6413:

Precast concrete units shall comply with the requirements of the latest SABS 986 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 precast balustrades, all such durability testing shall be done in accordance with clause B6404(h) and shall fall within the severe category. For units within the 5 km zone from the coast the very severe category shall be used and increased cover shall be as specified by the engineer.

B6414 QUALITY OF MATERIALS AND WORKMANSHIP

(a) Criteria for compliance with the requirements

Add the following paragraphs after the first paragraph:

"Test no. B8106(g) (i) shall be conducted to confirm that the specified depth of concrete cover has been achieved. The frequency of these tests shall be as described under item B8106(g). The test results shall be accepted or rejected on the criteria set out in Table B6404/3 based on the following categories:

(i) Full Acceptance

Concrete shall be accepted unconditionally and full payment shall be made.

(ii) Conditional Acceptance

Concrete may be accepted with a warning that construction methods be examined to improve the durability criteria. A reduced payment shall be applied to all the relevant pay items under 6300 and 6400 for the non-conforming element or concrete pour as set out in Table B8212/1, or the contractor may elect to carry out remedial work to improve the durability of the concrete to the criterion of "Full Acceptance" to the satisfaction of the engineer, and receive full payment.

(iii) Rejection

The concrete shall be removed and replaced with fresh concrete at the expense of the contractor, as directed by the engineer.

Should the test result(s) indicate conditional acceptance or rejection of the item tested, the contractor shall have the option of carrying out additional tests on that item, at his own expense to confirm or disapprove the original test result(s). Not more than two such additional tests shall be carried out.

Should one additional test confirm the original test result, then the original result shall serve to determine payment in accordance with Table B8212/1.

If two additional tests are carried out and both such tests show an improvement on the original test result(s) then the effective penalty as per table B8212/1, based on the original test result(s), shall be halved."

(b) Procedure in the event of non-compliance with the requirements

Add the following subsubclause:

"(iii) Structural concrete elements or concrete pours shall be represented by test cubes and extracted cores which shall be tested for strengths and the appropriate durability parameters. If the durability parameters have been proved to be acceptable the costs for such testing shall be borne by the Employer. However, where non-compliance to the specified parameters has been identified, the assessed element shall be rejected and at the engineer's sole discretion any of the following measures may be considered at the contractor's expense:

(1) Coating with an approved product specifically designed to improve the non-conforming parameter depending on the severity of the test results.

(2) Acceptance at reduced payments

(3) Demolition and reconstruction

Where the engineer allows conditional acceptance, reduced payment shall be applied to all the relevant pay items under 6300 and 6400 for the non-conforming element or concrete pour according to the table B8212/1."

B6416 MEASUREMENT AND PAYMENT

Add the following at the beginning of clause 6416:

Item	*Unit*
B64.08 Sealing surfaces with an approved penetrating silane based water repellent……	square metre (m^2)

The unit of measurement shall be the square metre of completed concrete element sealed using an approved silane based water repellent as described in clause B6404(h) of these Project Specifications.

The tendered rates shall include full compensation for providing the silane coating and applying it to the concrete surface in accordance with the manufacturer's specified nominal rates of application. Partial payment shall be applied in the event that the engineer allows conditional acceptance."

SECTION B8100: TESTING MATERIALS AND WORKMANSHIP

B8106 TESTING THE CONCRETE

Add the following new sub clause:

"(g) Testing for concrete durability

Durability predictions for durability concrete will be based on the depth of concrete cover test that shall be carried out by the contractor. The test (non-destructive) shall be conducted to confirm that the specified depth of concrete cover has been achieved. The cover meter tests shall cover at least $1m^2$ for every $10m^2$ exposed. The average cover of the 1 m^2 subjected to the test shall be used to determine the payment as per Table B8212/1 unless the contractor chooses to carry out additional tests as detailed in the final paragraph of clause B6414 (a). The cover meter must be calibrated for each project by drilling and measuring actual cover in at least 3 locations to validate the readings.

The description of the test is set out below:

(i) Depth of concrete cover

The procedure for testing for depth of reinforcement from concrete surface shall be in accordance with the manufacturer's requirements for the relevant electromagnetic cover meter. The number of readings taken of the layer of rebar closest to the concrete surface to each $1m^2$ to be tested shall be such that an accurate average cover can be determined for the tested area. For purposes of calculation of the overall cover of a rebar layer those bars that have a cover 10mm or more greater than specified shall not be included."

B 8117 MEASUREMENT AND PAYMENT

Add the following pay item :

B81.04 Durability tests requested by the engineer

"(a) Tests for concrete cover..... (m^2)

The unit of measurement shall be the square meter (m^2) of area actually tested.

The tendered rate for item (a) shall include full compensation for all labour, material and equipment required to execute the work including all testing and reporting by an approved laboratory. Payment shall not be made for any of the above tests, if the tests indicate that the durability parameters for concrete are not complied with the specified criteria."

SECTION B8200: QUALITY CONTROL

Add the following clause:

"B8212 DETERMINING REDUCED PAYMENTS FOR CONCRETE

Payments for all concrete shall be based on the test results of the durability parameters and calculated according to Table B8212/1.

General note:

The overall percentage payment applied to a concrete member shall be based on the average of the percentage payments applied to each durability parameter, together with the percentage payment based on the strength requirements described in section 8200 of the standard specifications. The reduced payments shall apply to the relevant pay items of sections 6200 and 6400 for that element only.

The following notes shall apply to Table B8212/1:

1. Percentage payment for concrete cover shall be based on the average number of cover meter tests performed on a particular concrete element.

Table B8212/1, TABLE OF REDUCED PAYMENTS FOR CONCRETE COVER

CONCRETE COVER (mm)	TEST RESULT (Clause B8106 (g)(iv)		PERCENTAGE (%) PAYMENT
	Overall	Individual bar	
30 mm specified	≥ 40 ≥ 30 < 40 ≥ 20 < 30 < 20	≥ 45 ≥ 30 < 45 ≥ 15 < 30 < 15	rejection 100 % 70 % rejection
40 mm specified	≥ 50 ≥ 40 <50 ≥ 30 < 40 < 30	≥ 55 ≥ 40 <55 ≥ 25 < 40 < 25	rejection 100 % 70 % rejection
50 mm specified	≥ 65 ≥50 < 65 ≥ 40 < 50 < 40	≥ 70 ≥ 50 < 70 ≥ 30 < 50 < 30	rejection 100 % 70 % rejection
60 mm specified	≥ 75 ≥ 60 <75 ≥ 45 < 60 < 45	≥ 85 ≥ 60 <85 ≥ 40 < 60 < 40	rejection 100 % 70 % rejection
65 mm specified	≥ 80 ≥ 65 < 80 ≥ 50 < 65 < 50	≥ 90 ≥ 65 < 90 ≥ 40 < 65 < 40	rejection 100 % 70 % rejection
75 mm specified	≥ 95 ≥ 75 < 95 ≥ 55 < 75 < 55	≥ 105 ≥ 75 <105 ≥47< 75 < 47	rejection 100 % 70 % rejection
80 mm specified	≥ 100 ≥ 80 < 100 ≥ 60 < 80 < 60	≥ 110 ≥ 80 < 110 ≥ 50 < 80 < 50	rejection 100 % 70 % rejection

PARTICULAR SPECIFICATION SERIES 12000

REHABILITATION OF STRUCTURES AND BRIDGES

a) SERIES 12000: REHABILITATION OF STRUCTURES AND BRIDGES

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SECTION 12 100: ACCESS FOR BRIDGE REHABILITATION

12 101 SCOPE

This specification covers the requirements for the provision of suitable and safe access to all areas requiring concrete demolition, repair work or rehabilitation of bridges in accordance with the contract, and for inspections by the engineer.

This specification shall be read with the COLTO Standard Specifications for Road and Bridge Works for State Road Authorities (1998 edition), in particular Section 1200: General Requirements and Provisions, and Section 1300: Contractor's Establishment on Site and General Obligations of the Standard Specification.

12 102 INTERPRETATION

(a) Supporting specifications

The following specifications shall be read with, and shall form part of the contract:

- Project Specification
- COLTO Standard Specifications for Road and Bridge Works for State Road Authorities (1998 edition).
- SABS and BS standards referred to in this specification.

(b) Definitions

(i) Temporary works

The temporary works necessary for access to the work area includes all foundations, scaffolding and support structures, working platforms, cradles, fixtures to existing structural members, etc. required for the safe access to and execution of the work, and for the protection of passing persons, animals and vehicles against injury or damage and prevention of damage and littering to the environment.

(ii) Mobile access unit

A mobile access unit consists of a vehicle-mounted access gantry and work platform, including mobile crane type units.

(iii) Location

Location means a specific bridge as a whole where rehabilitation work has to be done.

(iv) Structural element

Setting up at each structural element as measured in the pricing schedule shall include all movement from point to point on a particular element. Structural elements are abutments, piers, decks and parapets/balustrades/edges of deck only. Other parts of a bridge shall be deemed to be included in the structural element to which they are most closely associated. A pier, abutment, deck or balustrade/parapet/ edge of deck may comprise single or multiple elements.

12 103 GENERAL REQUIREMENTS

The contractor shall provide and will be responsible for safe access structures and work platforms to all areas requiring remedial work. The access and temporary works shall be designed, constructed and maintained in accordance with the current relevant safety regulations, all in compliance with the Occupational Health and Safety Act (Act 85 of 1993) and its applicable Regulations, and shall remain in place until removal is authorised by the engineer. Appropriate allowances shall be made for screening of the work and other protective measures required by the various work activities.

Access and work platforms may be provided from overhead mobile access gantries or vehicles, or from temporary works supported from the ground or fixed to structural members. The design and erection/construction of such temporary works shall be certified by a professional engineer on behalf of the contractor to comply with the relevant safety regulations regarding strength and stability for all imposed loads that can be anticipated to arise from the specified work activities.

Notwithstanding approval given by the engineer for the design and drawings prepared by the contractor and the acceptance of temporary works including the working platform(s) and access structure(s) as constructed, the contractor shall be solely responsible for the safety and adequacy of the temporary works and shall indemnify and keep indemnified the employer and engineer against any losses, damage to persons or property, all claims, demands, proceedings, damages, costs, charges and expenses whatsoever, which may arise out of or in consequence of the design, construction, use and maintenance of the temporary works.

For works on, over, under or adjacent to any railway line which is controlled by Transnet, the contractor shall comply, inter alia, with the requirements for the preparation and submission of drawings for falsework and formwork, and the submission of certificates for the proper construction thereof, all in accordance with the latest Transnet Specification, E7(2).The contractor shall submit to the engineer the relevant design details and drawings of the working platform(s) and access structures for comment and/or record purposes.

Abseiling techniques shall not be allowed.

The contractor shall comply with any additional imposed or physical restraints upon the means of access to and from the structure as stated in the project specification and/or the drawings.

The contractor shall provide access facilities for inspection and testing by the engineer, including the inspection at the end of the maintenance period. Any specific access facility required for the inspection at the end of the maintenance period shall be as specified in the pricing schedule.

12 104 MATERIAL

All timber, structural steel and scaffolding used shall be free from defects that may prejudice the stability of the working platform(s) and access structures. The jacks, devices, clamps and fittings shall all be in good working order and of adequate design and strength.

The type, grade and condition of the material shall be subject to the engineer’s inspection.

12 105 PLANT AND EQUIPMENT

(a) Mobile access units

Access structures and work platforms mounted and operated from a mobile vehicular support base shall be of an approved type and capacity for the intended use. The unit shall at all times be operated within the recommended limits in terms of reach and capacity as stated by the manufacturer or the authority responsible for the operation and maintenance of the access unit.

The contractor shall, prior to dispatching the mobile access unit to the site, provide certification from the manufacturer or the operating authority that the unit has been thoroughly inspected and serviced, that the unit is functioning properly and that it complies with the relevant safety regulations.

(b) Scaffolds, platforms and cradles

Temporary works entailing scaffolds, platforms and cradles providing access to the work area shall be assembled and constructed from materials and structural sections complying with the relevant specifications. The temporary works shall be designed, erected, operated, maintained and dismantled so as to ensure safe working conditions for all site personnel, and where necessary the safety of the general public having access to the site.

12 106 CONSTRUCTION

All temporary access structures and work platforms and associated works shall be erected, modified, maintained and dismantled under the direction of an experienced and competent supervisor or safety officer.

Prior to using any temporary access structure or facility, and at regular intervals thereafter, or following unforeseen circumstances, the temporary works shall be inspected and certified by a suitably experienced and qualified person on behalf of the contractor.

To ensure the safety of, and to prevent injury or damage to passing persons, vehicles, animals, etc the temporary works shall be enclosed with a suitable screening membrane or boarding where necessary to contain material or work equipment within the limits of the restricted work area.

Suitable debris containers and chutes shall be provided to assist in the removal of debris and unusable or rejected materials.

Where temporary works are to be fixed to, or supported from an existing permanent structure, the location shall be subject to the approval by the engineer. Such temporary works shall be removed when the work is completed and any holes, surface damage or blemishes arising from the fixture shall be repaired to the surface finish of the adjacent surface to the satisfaction of the engineer.

12 107 MEASUREMENT AND PAYMENT

The payment items in this clause shall include full compensation for all works items associated with the provision of suitable and safe access to all areas on site which are not already covered by the measurement and payment

items of the Standard Specifications, i.e. all temporary works related to access structures and work platforms, or mobile access units including associated plant, equipment and labour.

Item		Unit
121.01	**Temporary access structures and work platforms**	

Access and platform to (height range indicated)

(i) Design, supply and erect at the following structural elements and height ranges inclusive of dismantling and moving to the next structural element ..... lump sum/ meter/No

The unit of measurement for each subitem shall be either lump sum, meter or the number as scheduled.

The height range shall be measured from the average ground surface to the agreed height limit accessed from the work platform.

The height range shall be measured in the following height bands:

- 0m up to 5,0m
- Exceeding 5,0m up to 10,0m
- Exceeding 10,0m up to 20,0m
- Etc. in increments of 10m height

The tendered amount shall include full compensation for design, supply, fabrication, erection, dismantling, movement and for all labour, materials, and equipment required for the above works including the inspections, supervision by the safety officer and maintenance of the temporary access structure and work platform.

The amount shall also include for all temporary traffic accommodation required during the deployment of the access equipment.

Payment shall be made on completion of each subitem:

Item		Unit
121.02	**Mobile access units**	

(i) Establishment of mobile access unit on site (description of unit) ..... lump sum
(ii) Setting up of mobile access unit at each location (bridge location)
(iii) and removal after completion .....number (No)
(iv) Operation of mobile access unit during repair work at each
(v) location (bridge structure) .....days
(vi) Operation of mobile access unit during inspections by the engineer ..... hours (h)
(vii) Standing time authorised by the engineer ..... hours (h)
(viii) De-establishing and removal of mobile access unit from site after completion of work ..... lump sum

The unit of measurement for each subitem shall be the lump sum, number or hours as indicated.

The tendered amounts and rates shall include full compensation for all labour, plant and equipment required to procure, transport to site and to establish the mobile access unit including all costs related to inspection, operation and maintenance of the unit on site. The amount shall also include all temporary traffic accommodation required during the deployment of the access unit.

The tendered rate for subitems (a) and (f) shall cover all costs necessary for establishing and deestablishing of the mobile access unit on site.

The tendered rate for subitem (b) shall cover the cost for setting up of the mobile unit at each of the number of locations scheduled, and removal after completion of the work at the location.

The tendered sum for subitem (c) shall cover all costs for operating the mobile access unit on location for the full time required to complete the repairs, depending on the critical path of the construction programme. Idle time and standing time shall not be measured separately and shall be deemed to be included in the tendered sum for operation of the mobile unit.

The tendered rate for subitem (d) shall cover the cost of operation of the mobile access unit as required by the engineer. No payment shall be considered for this item if the engineer requires the use of the mobile access unit while it is on location for the normal work to be done under the contract and not specially re-established on the location for the purpose of inspection only.

The tendered rate for subitem (e) shall cover the cost for standing time ordered or authorised by the engineer on occasions where the mobile access unit is specifically required for the use of the engineer.

Item **Unit**

121.04 Temporary access structures and work platforms

(a) Access and platforms to locations as described as well as dismantling and removal at completion (heights assessed by contractor)

1) (Description of bridge given)

(i) (Member of portion of work requiring access described) ..... lump sum
(ii) (Etc. for other members of portion of work) .....lump sum

2) (Etc. for other bridges)

(i) (Member of portion of work requiring access described) ..... lump sum
(ii) (Etc. for other members of portion of work) ..... lump sum

The unit of measurement for each subitem shall be the lump sum.

The height of the required access platforms can be estimated from the drawings but must be confirmed on site. The heights must be assessed by the contractor at the time of tender.

The tendered amount shall include full compensation for design, supply, fabrication, erection, dismantling, movement and for all labour, materials, and equipment required for the above works including the inspections, supervision by the safety officer and the maintenance of the temporary access structure and work platform.

The amount shall also include for all temporary traffic accommodation required during the deployment of the access equipment.

Payment shall be made on completion of each subitem.

Item		**Unit**
121.05	**Attendance by (relevant authority)**	

(a) Prime cost sum to allow for attendance by relevant authority to obtain access near electrified railway lines (give description of bridge) .....prime cost sum

(b) Percentage on prime cost sum for charges and profits .....percentage (%)

A prime cost sum is provided in the pricing schedule to cover the cost of this work.

Payment for obtaining this service shall be in accordance with the provision of the general conditions of contract.

SECTION 12 200: DEMOLITION AND REMOVAL OF STRUCTURAL CONCRETE

12 201 SCOPE

This specification covers the work in connection with the demolition of entire members of a concrete structure as well as cutting back concrete to expose reinforcement and the initial preparation of the exposed surface. Surface and structural repair of concrete members is covered in Section 10 300.

12 202 INTERPRETATION

(a) Supporting specification

The following specifications shall be read with, and form part of the contract:

(i) Project Specification
(ii) COLTO Standard Specifications for Road and Bridge Works for State Road Authorities (1998 edition)
(iii) SABS and BS standards referred to in this specification

(b) Definitions

(i) Concrete members

All references to concrete members shall include mass concrete, un-reinforced, reinforced and prestressed concrete members.

(ii) Demolition of concrete members

Demolition means the breaking up and removal of an entire concrete member.

(iii) Removal of concrete

Removal of concrete means cutting back into the surface or end of a concrete member and the removal of unsound, damaged or contaminated concrete, or the partial removal of concrete sections, to expose a sound surface for bonding new material for the repair or extension of the concrete member.

12 203 MATERIALS

All devices used to remove concrete or to demolish concrete members, shall be handled, stored and used strictly in accordance with the manufacturer's instructions and current safety regulations.

12 204 PLANT AND EQUIPMENT

(a) General

All plant, equipment, tools and devices used for the demolition of concrete members or the removal of portions of existing concrete shall be based on proven and accepted technology within the industry. The plant, equipment, tools and accessories shall be inspected and maintained on a regular basis to ensure that they remain in good working order, function efficiently, and that safety is not compromised. All cutting and breaking tools shall be kept sharp to reduce the force required to break out concrete to a minimum.

The plant, equipment, tools and devices used for the demolition or removal process shall be of the accepted type and capacity for the relevant application. The suitability of the chosen method shall be demonstrated on a representative test section identified by the engineer prior to the execution of any programmed work.

(b) Access structures and working platforms

Where necessary, the contractor shall provide suitable and safe temporary access structures, working platforms, debris collection and removal chutes and bins, including protection screens where required, at each location where concrete has to be demolished or removed.

The temporary structures, platforms, chutes, etc must be stable and of sufficient strength and rigidity to safely carry the imposed temporary loads arising from the work activity, all as described in Section 12 100.

12 205 CONSTRUCTION

(a) Sequence of execution

The method and sequence of demolition or removal of concrete shall be in accordance with the drawings or as directed by the engineer and the approved method statement submitted by the contractor following pre-construction testing if necessary.

Any temporary propping specified in the approved method statement and the drawings shall be securely positioned in accordance with each stage of the demolition or removal sequence prior to commencement of the following stage.

(b) Site preparation and access

The necessary access and temporary support structures shall be in place prior to the commencement of demolition or removal of concrete. Screening and protective measures shall be established around the work area as necessary to ensure acceptable environmental, health and safety conditions.

(c) Demolition of concrete members

The demolition of entire concrete structures or major elements of a structure shall employ techniques that do not damage adjacent structures or structural elements, nor contaminate the surrounding environment except during special periods as may be approved by the engineer.

The contractor shall ensure that any nuisance associated with his work activity is minimised by implementing appropriate precautions and measures to the approval of the engineer. Common nuisances associated with demolition and concrete removal include fumes, noise, dust, flying fragments, heat and vibration.

Concrete members which are to be demolished completely shall be broken into suitably sized fragments to allow easy removal from site to an approved dump area.

Recommended demolition techniques include the use of percussion breakers, chisels or other approved mechanical equipment, the use of thermal or hydraulic cutting techniques or by non-explosive chemical means, to ensure minimal damage (e.g. micro-cracking) to the existing concrete. Demolition by explosive means will normally not be acceptable and will be subject to the engineer's written approval. Water jet removal of concrete is preferred wherever feasible.

(d) Removal of concrete from structural elements

(i) Cutting back concrete to a new finished surface

The concrete and reinforcement shall be cut back adequately to provide the prescribed concrete cover to the new finished surface as indicated on the drawings or as directed by the engineer. The technique used shall be suited to its intended purpose and shall not cause damage to the remaining concrete member.

Only techniques that do not damage the inherent structure, bond or strength of the remaining sound concrete shall be used. The thermal cutting technique shall not be used closer than 100mm from the final surface as indicated on the drawings. The remaining concrete shall be removed using approved mechanical equipment or hydraulic techniques.

The fixed exposed contact surface shall be bounded by straight line edges cut at least 10mm deep by a diamond cutting saw, angle grinder or other approved equipment.

(ii) Cutting back concrete to expose reinforcement

Where a concrete member has to be joined or extended or replaced by new concrete, the concrete shall be carefully cut or broken from the reinforcement bars to expose the bars to the dimensions and outline as shown on the drawings or as directed by the engineer. Care shall be taken not to damage or reduce the strength of the exposed bars or concrete member thereby making them unfit for use. The remaining concrete contact surface shall be cut to a plane and even surface with exposed faces perpendicular to the horizontal face or side faces as applicable.

The bounding lines of the cut concrete shall be straight and neat cut to at least 10mm depth using a diamond cutting saw, angle grinder or other approved concrete cutting equipment.

(e) Removal of metal sections embedded in concrete

Metal sections that are embedded in concrete members by means of grout pockets shall be removed by carefully chipping out the embedment grout filling the pocket. Care shall be taken not to damage the structural concrete surrounding the pocket. Suitable tools such as hand-held power tools with chisel bits or hand tools shall be used.

Following the removal of the metal section, all remaining grout shall be removed and the pocket cleaned out to expose only solid concrete surfaces. The pocket shall be finally cleaned using high-pressure water jetting or oil-free compressed air to remove all loose fragments of grout, or concrete aggregate.

(f) Preparation of exposed contact surfaces
(For extension of existing concrete elements or construction of new concrete members)

All loose and shattered concrete, as well as foreign material such as oil, paint, grease, etc shall be removed from the contact surface of old concrete before new concrete is placed. The aggregate must be exposed to provide a good bonding surface.

The mechanically prepared concrete surface shall be cleaned by means of oil-free compressed air or water jetting.

The breaking out and preparation of damaged, spalled and/or cracked concrete surfaces is described and measured under the Sections 12 300 and 12 400.

(g) Disposal of waste material

All waste materials, rubble, scrap and rubbish arising from the contractor's presence on site and/or the execution of the works shall be disposed of weekly to a disposal site identified by the contractor and approved by the engineer.

F12 206 TOLERANCES

The contractor shall remove concrete to a planar, uniform surface with 25mm maximum deviation from the level or dimension indicated on the drawings unless otherwise approved by the engineer. The outer edge of the contact surface shall consist of straight lines with maximum deviation of 5mm from straight, measured with

A 1m long straight edge, and shall be within 5mm of the position indicated on the drawings, or as instructed by the engineer.

F12 207 TESTING

The contractor shall carry out pre-construction tests with the proposed equipment to determine the suitability of the technique for the envisaged application. The test results shall be reported to the engineer and shall be subject to the engineer's approval.

F12 208 MEASUREMENT AND PAYMENT

The payitems in this clause shall include full compensation for all work associated with the demolition and removal of concrete structural elements including initial preparation of concrete surfaces or portions thereof which are not already covered by the measurement and payment items of the Standard Specifications or the Project Specification, such as procurement, transport, access and temporary works, plant and equipment required to undertake the work as specified. General access, work platforms and associated temporary works are covered in Section 12 100.

The quantities indicated in the pricing schedule under Section 12 200 are based on the dimensions shown on the drawings and on inspections carried out as part of the preliminary and detail design phases increased to allow for unseen work. It must, however, be accepted that the quantities of work actually done may vary significantly from the scheduled quantities, and that the contractor shall be deemed to have allowed in his tendered rates for such variations in quantities which can be reasonably expected.

Item		**Unit**
122.01	**Demolition of concrete members (location and description)**.....	cubic metre (m^3)

The unit of measurement is the cubic metre of concrete demolished, measured in its original position and shape based on:

(i) Full demolition
(ii) Partial demolition

The tendered rate shall include full compensation for all labour, material, screening of the structure for safety and environmental protective measures, equipment and plant as well as for all work and incidentals required to complete the work as specified and required to demolish the concrete member and to load, transport and dump the concrete segments and rubble at the nearest approved dumping site. See 12 205 (c) & (g)

Item		**Unit**
F122.02	**Removal of metal sections embedded in concrete (description)**……	number (No)

The unit of measurement shall be the number of metal sections removed.

The tendered rate shall include full compensation for all labour, materials, equipment, screening of the structure and protective measures, required for the removal of the metal sections as described in 10 205(e) and disposal of all rubble at an approved waste disposal site, and the cleaning of the pocket as specified in 12 205(e).

SECTION 12 300: SURFACE AND STRUCTURAL REPAIR OF CONCRETE MEMBERS

12 301 SCOPE

This specification covers the requirements for the surface and structural repair of structural concrete members. It covers the requirements for the removal of defective or contaminated concrete and/or reinforcement, the preparation of the exposed concrete surface and reinforcement for the rehabilitation of the member, and the repair or replacement of concrete with cementitious mortars, epoxy systems and proprietary concrete repair compounds.

The removal of defective or contaminated concrete, partial removal of concrete sections and the initial preparation of contact surfaces are covered in Section 12 200.

12 302 INTERPRETATION

(a) Supporting specifications

The following specifications shall be read with and shall form part of the contract:

(i) Project Specification

(ii) COLTO Standard Specifications for Road and Bridge Works (1998).

12 303 MATERIALS

(a) Proprietary cementitious repair compounds

The materials for proprietary cementitious repair compounds shall be supplied as a factory pre-packed dry premix of cements, aggregate and other proprietary products requiring only the addition of pre-packed liquid or a prescribed volume of water of an approved quality to produce the usable repair product. The proprietary repair compound shall compensate for shrinkage in both the plastic and hardened states and shall be suitable for use in the proposed mix and placing techniques.

Proprietary concrete shall be highly workable and self-compacting without the use of vibrators. The aggregate grading shall be designed to prevent segregation during transportation and placing. The concrete system shall have a low alkali content to ensure minimal risk of alkali-silica reaction and shall contain no chlorides. The proprietary concrete shall comply with the material properties as indicated on the detail drawings, alternatively the following shall apply:

Table 12 303/1: Characteristic compressive strength (Minimum)

AGE (DAYS)	COMPRESSIVE STRNGTH (MPa)
3	30
7	40
28	60

Modulus of Elasticity (Static): 30 GPa < Ec < 35 GPa -BS 1881 : Part 121 : 1983

All the necessary health, safety and fire precautions stated by the manufacturer shall be complied with.

Only material of which the shelf life has not expired shall be used.

12 304 PLANT AND EQUIPMENT

All plant and equipment used for the preparation of concrete surfaces, batching of material and mixing operations shall be in good working order and suited for the intended use. The plant shall be inspected, serviced and calibrated at regular intervals and tested to ensure proper functioning, all to the satisfaction of the engineer.

12 305 CONSTRUCTION

(a) Preparation of repair surfaces

(i) Preparation of concrete contact surface

All surface laitance and damaged, loose and soft concrete, concrete containing aggressive ions e.g. chloride, as well as all foreign materials such as oil, paint, grease, etc shall be removed from the contact surface using pneumatic chisels or other approved mechanical equipment or thermal/hydraulic techniques. The contact surface shall be treated to expose the aggregate by means of chiselling, sand blasting or high-pressure water-jetting or where it can be shown to produce the required aggregate exposure, a hard brush may be used subject to the engineer's approval.

The mechanically prepared concrete surface shall be cleaned of dust by means of oil-free compressed air or water-jetting.

The area to be repaired shall be bounded by straight line edges cut to the required depth using a diamond cutting saw, angle grinder or other approved equipment. The edges shall be recessed such that the patch has a thickness at the edge of at least twice the maximum aggregate size of the patching material, but in any case not less than 10 mm.

(b) Bonding layer

i) Cementitious mortar or concrete repair

Concrete surfaces that exhibit a high moisture absorption shall be wetted prior to patching, the mortar being applied only when the surface has dried sufficiently to achieve the saturated-surface dry condition and exhibit a matt moist appearance, preferably on the dryish side.

The bond of the patching mortar to old concrete may be enhanced by brushing a thick cement paste into the prepared concrete surface before applying the mortar to the fresh paste.

Generally, the cement paste shall consist of one part cement (same type as for patching mortar) and one part sand (< 2 mm) mixed with water to a thick, but fluid consistency.

The use of polymer dispersive additives to improve workability and bond characteristics shall be subject to the approval of the engineer.

Alternatively, an approved adhesive or bonding agent may be applied to the prepared surface so as to enhance the bond of the fresh mortar to the dry concrete in accordance with the manufacturer's instructions. Only compatible materials shall be used.

(i) Proprietary cementitious repair compounds

The suitability of the repair compound for a particular application shall be proved by testing or submission of an approved industry track record of usage under similar circumstances.

The contractor shall submit details of the proprietary cementitious compounds to the engineer for approval prior to its use in the permanent works.

The repair systems shall be either:

A. Repair System 1:

Bonding agent	Sika-Top Armatec 110 Epocem
Proprietary cementitious Repair compounds	Sika MonoTop 612

B. Repair System 2:

Alternative as proposed by the contractor (proof of equivalency to the above must be shown).
The contractor shall submit details of Repair System 2 timeously to the engineer for approval during the tender period

(iii) Proprietary cementitious repair compounds

The repair compound shall be mixed strictly in accordance with the manufacturer's specifications. Unless otherwise specified the product shall be thoroughly mixed in a forced-action mixer of adequate capacity. Alternatively a suitably sized drum may be used with a slow speed (400/500 rpm) high-torque rotary drill fitted with an approved mixing paddle. The contents shall be properly mixed to ensure a smooth, uniform mix.

The mixing capacity and placing capacity of equipment and labour shall be adequate and matched to enable placing operations to be carried out continuously within the recommended placement time of the product, generally within 20 minutes of mixing ensuring a smooth, uniform mix. The mixed product shall be passed through a suitable coarse metal screen prior to placing or pumping to remove any lumps of unmixed product. Tools and equipment shall be cleaned after each batch and all previously mixed material shall be removed from tools and equipment prior to charging and mixing a new batch of repair compound.

(e) Formwork for structural concrete repair

All formwork surfaces which will be in contact with proprietary concrete repair compounds shall be treated with a suitable mould release agent. The formwork surfaces shall match the existing surface textures as closely as possible.

The formwork shall be constructed to be leakproof with suitable provision for the drainage of pre-soaking water or access for the application of a surface bonding layer immediately prior to placing the repair concrete.

(f) Application of the repair material

(iv) Proprietary cementitious repair compound

The proprietary compound shall be applied in accordance with the manufacturer's recommendation and specification.

The minimum layer thickness shall be 10 mm with a maximum as specified by the manufacturer, depending on the orientation of the application.

Each layer of repair compound shall be thoroughly worked and compacted into the repair zone ensuring that full contact with the primed contact surface is achieved and no air entrapment occurs. All sagging or slumping material shall be removed and the contact surface cleaned prior to re-application using a reduced layer thickness.

(iii) Proprietary cementitious repair compounds

Immediately after the proprietary compound has been applied or after formwork has been removed, the repaired surfaces shall be thoroughly cured by means of an approved curing compound and procedure suitable to, and compatible with the repair compound.

(b) Partial removal of concrete to expose reinforcement

Where a structural element contains embedded reinforcement which will be re-used in the rehabilitation process, the concrete shall be carefully chipped away without damaging the reinforcing bars. Damaged bars shall be replaced with new reinforcement of similar type and size, subject to the engineer's approval.

12 306 TOLERANCES

The contractor shall apply the patching mortar or concrete and finish the surface to the line and level of the existing concrete and within the tolerances specified on the drawings, or if none is specified, to the tolerances specified in COLTO Standard Specification, Section 6800.

12 307 TESTING

(a) Material

The contractor shall ensure that only compatible materials are used as ingredients for the repair mixes.

The contractor shall carry out pre-construction compatibility tests on the proposed repair system to ensure that the strength and serviceability requirements of the structural rehabilitation are met. The test results shall be reported to the engineer and shall be subject to the engineer's approval.

(b) Acceptance testing

The engineer will assess cast repair concrete or proprietary cementitious compounds according to Section 6400, clause 6414 of the COLTO Standard Specifications and the relevant subclauses and any applicable Project Specifications.

Repair material for surface repair will be assessed for compliance based on the 28day mean strength test result compared to the specified 28-day compressive strength for each class of repair material.

The criteria for compliance with the strength requirements shall be the mean strength result of three test cubes made from the repair material mix used, which are then prepared and tested in accordance with SABS 863 and other relevant standards, by an SABS accredited laboratory.

Test cubes shall be stored and cured in a manner appropriate to the materials to be tested in accordance with the manufacturer's instructions and shall be properly identified.

The strength results shall represent the section of work executed in the period as agreed to by the contractor and the engineer in advance of sampling.

The work at risk due to non-compliance shall be that executed during the agreed period represented by the strength results that failed to achieve the specified strength.

As a consequence of non-compliance in terms of the acceptance criteria, the contractor shall take such remedial action as the engineer may consider necessary. Such action may include removal and replacement of material in repairs at risk and/or further testing. All such costs shall be borne by the contractor.

12 308 MEASUREMENT AND PAYMENT

The payment items in this clause shall include full compensation for all work associated with the repair of concrete structures which are not already covered by the measurement and payment items of the COLTO Standard Specifications or the Project Specification, such as procurement, transport, additional access and temporary works, plant and equipment required to undertake the work as specified. General access and work platforms and associated temporary works are covered in Section 12 100.

The quantities indicated in the Schedule of Quantities under Section 12 300 are based on inspections carried out as part of the preliminary and detail design phases increased to allow for defects that are not visible. The actual work done may vary significantly from the scheduled quantities and the contractor shall be deemed to have allowed in his tendered rates for such variations as can be reasonably expected.

New reinforcement will be measured separately.

ITEM		UNIT
123.03	**Preparation for & application of Proprietary** cementitious repair compound (Repair systems) to (description)	litre (*l*)

The unit of measurement is the litre of proprietary repair compound used for the repair of specified concrete defects.

The tendered rate shall include full compensation for all labour, materials, equipment and plant as well as for all work and incidentals required to break out, prepare, prime all surfaces, repair and cure the designated areas (including for wastage) all in accordance with the project specifications and the repair material manufacture's procedures, methods and specifications.

SECTION 12 400: GROUTING AND CRACK INJECTION

12 401 SCOPE

This specification covers the requirements for the filling of gaps, holes and pockets with fluid grout systems and the injection of cracks and cavities with low-viscosity liquid epoxy systems.

12 402 INTERPRETATION

(a) Supporting Specification

The following specifications shall be read with and shall form part of the contract:

(i) Project Specification
(ii) COLTO Standard Specifications for Road and Bridge Works (1998)

(b) Definitions

(i) Grouting

Grouting means the filling of gaps between structural elements by using gravity techniques or to fill holes or pockets in concrete members including the embedment of dowels, anchors, steel sections, etc.

Grouting is generally done with a proprietary high-strength, non-shrink, cementitious compound or epoxy system.

(ii) Crack injection

Crack injection means the filling of cracks and internal cavities in concrete members with low-viscosity liquid epoxy adhesive by a low-pressure injection procedure.

(iii) Epoxy adhesive

Epoxy adhesive means the compound that serves to bond together two separate materials or contact faces resisting the interfacial stresses to ensure structural composite action of the joined materials.

12 403 MATERIALS

(a) Grout

(i) Cementitious grout

The materials for the grout shall be supplied as a factory pre-packed dry premix of Portland cement powder, graded fillers and other proprietary products requiring only the addition of water to produce the required consistency ranging from a plastic state to a free-flowing liquid grout. The proprietary grout shall compensate for shrinkage in both the plastic and hardened states whilst hardening free of bleeding and settlement, without gas-generating and air-releasing agents.

Free-flowing grouts shall be suitable for use by pumping and mix-and-pour placing techniques, and shall be highly workable, self-compacting and self-levelling without the use of vibrators. The grout shall have a low alkali content to ensure minimal risk of alkali-silica reaction and shall contain no chlorides.

The proprietary grout shall comply with the material properties indicated on the detail drawings or by reference to a particular product.

Only material of which the shelf life has not expired shall be used.

All necessary health, safety and fire precautions according to the manufacturer's specifications shall be complied with.

(iii) Working characteristics of grout

- Application

The grout system shall be suitable for application by pouring into gaps, holes or pockets depending on the particular circumstances.

- Cure time and temperature

The grout shall be capable of curing to the required strength at ambient temperatures between 10 °C and 40 °C in relative humidities up to 95 %.
The grout must cure sufficiently within 24 hours, to the compressive strength specified on the drawings, with negligible shrinkage on curing.

(b) Crack injection

(i) Adhesive

The adhesive used for epoxy injection into cracks in concrete shall consist of an unfilled, solvent-free, two-part epoxy consisting of resin and hardener components. The epoxy shall be polyamide-based with a high resistance to moisture and low creep values under sustained loads.

The adhesive components shall be supplied in liquid form and in separate sealed containers. Each component shall have a different identifiable colour which results in a distinctive homogeneous colour when thoroughly mixed.

The adhesive shall mix readily to a smooth liquid consistency of low to medium viscosity and shall be suitable for injection into cracks on surfaces ranging from horizontal to vertical and on inverted overhead surfaces.

The mixed adhesive shall be free of lumps and the components shall not separate or settle out during the pot life of the adhesive.

The toxicity of the chemicals in the components shall be low enough to enable safe usage in confined areas on the construction site and in a normal workshop environment. If special ventilation is necessary such requirement shall be complied with.

(ii) Working characteristics of adhesive

- Application

The adhesive shall be suitable for injection into cracks and voids under low pressure. The viscosity of the epoxy shall be matched to the crack width and material macroporosity surrounding the crack, generally between 200 cP and 400 cP at 25 °C.
The adhesive shall be capable of bonding to dry and moist surfaces where the injected adhesive displaces moisture present in cracks and cavities.

- Pot life

The usable life (pot life) of the mixed adhesive shall exceed 60 minutes at 25 °C and a relatively high humidity, unless special circumstances dictate a fast-setting adhesive.

- Storage life

The storage life (shelf life) in the original sealed containers of both the resin and hardener shall not be less than 6 months stored at temperatures between 5 °C and 25 °C. Only batches of material of which the shelf life has not expired shall be used.

- Cure time and temperature

The adhesive shall be capable of curing to the required strength at temperatures between 10 °C and 40 °C in relative humidities of up to 95 %. The adhesive must cure sufficiently to confer the specified mechanical properties within 7 days, with negligible shrinkage on curing.

(iii) Mechanical properties of cured adhesive

- Moisture resistance

The adhesive shall be formulated to minimise moisture transport through the adhesive itself. Water absorption shall not exceed 2 % by mass after immersion for 24 hours in distilled water at 20 °C.

- Temperature resistance

The adhesive shall have a heat distortion temperature (HDT) of at least 50 °C.

- Flexural modulus

The instantaneous flexural modulus of the adhesive shall be between 2,0 GPa and 10,0 GPa at 20 °C. The adhesive must have a consistent static fatigue behaviour for temperatures ranging between -20 °C to 40 °C.

- Shear strength

The bulk shear strength of the adhesive shall exceed 12 MPa at 20 °C.

-Tensile strength

The tensile strength of the adhesive must exceed 12 MPa at 20 °C.

-Double lap shear strength

The average lap shear strength of a double overlap joint at failure using steel plates shall exceed 8 MPa at 20 °C.

-Epoxy resin injection

The crack repair systems, using epoxy injection, shall be either:

A. Repair System 1:
Low viscosity Adhesive — Sikadur 52 ZA

B. Repair System 2: Alternative as proposed by the contractor
The contractor shall submit details of Repair System 2 to the engineer for approval during the tender period.

(c) Quality control

The material manufacturer's quality control and conformance certificates and test results for each batch of material supplied to site shall be made available to the engineer upon request.

The average test results shall meet the specification requirements and no single result shall deviate by more than 15 % from the specified criteria.

(d) Packaging, handling and storage

All adhesive components shall be supplied in separate sealed containers of suitable sizes to obtain a workable quantity within the potlife of the adhesive. The components shall be packaged in the correct portions so that the entire contents of each container mixed together shall produce a mix of the correct proportions. The adhesive properties shall not vary significantly with minor variations in the mix proportions resulting from the container emptying process.

Each container shall be durably and legibly marked and complete records of stock acquired and issued for use, shall be kept. The containers shall be clearly marked with the following information:

(i) name of manufacturer;
(ii) manufacturer's product identification;
(iii) batch number and date of manufacture;
(iv) date of expiry of shelf life;
(v) manufacturer's instructions for mixing; and
(vi) safety precautions, warnings for handling and toxicity.

(e) Manufacturer's instructions

The manufacturer shall provide a dated, coded and titled instruction sheet with each delivery of adhesive. The following information shall be contained on the sheet in a clear and unambiguous manner:

(i) the general chemical type of each component used in the adhesive;
(ii) recommended storage conditions and shelf life when stored under these conditions;
(iii) preparation instructions for steel and concrete surfaces;
(iv) instructions for use of primers, including optimum dry film thickness and permissible ranges;
(v) mixing instructions, including allowable variations in mix ratio and any temperature control requirements during the mixing process;
(vi) application instructions, including limits on pressure, temperature, open time and relative humidity before injection;
(vii) safety precautions for all components of the adhesive; and
(viii) curing conditions and temperature-related precautions.

(f) Surface sealant for cracks

The surface sealant for cracks and for the bonding of injection ports to the concrete surface shall be an approved epoxy putty.

(g) Injection ports

Injection ports shall consist of short lengths (75 mm to 100 mm) of small diameter (3 mm to 5 mm ID), flexible, high-pressure plastic tubing each fitted with a locating end at the base for bonding in the crack sealant. The locating pin shall be supplied with a length of wire flattened at the end for accurate positioning of the tube over a crack.

Grease nipples or similar self-closing injection nipples shall not be used unless authorized by the engineer. Sufficient field testing to demonstrate the satisfactory operation of such injection port shall precede any approval application.

12 404 PLANT AND EQUIPMENT

(a) General

All plant and equipment used for pressure injection of epoxy resins shall be based on proven technology and practice, and shall be maintained in a clean and good working order. The equipment shall be inspected, serviced and calibrated at regular intervals and tested to ensure that the system functions efficiently and accurately, such procedures being to the satisfaction of the engineer.

(b) Pressure injection equipment

The type and capacity of the pressure injection equipment, delivery hoses and nozzles shall be such as to ensure the uniform supply of separate components to the mixing nozzle, thereby obtaining the correct consistency and a uniform discharge rate from the nozzle.

The pressure injection equipment shall be capable of continuously supplying the freshly mixed epoxy resin on demand. The equipment shall be fitted with properly calibrated positive displacement pumps and a pressure gauge capable of recording correct pressures applied up to 2,0 MPa with 0,1 MPa divisions.

The two components of the epoxy injection compound shall be fed separately to the extrusion gun and shall only be mixed together within the pressure chamber of the gun at the time of injection. On no account shall ready-mixed epoxy be fed to the extrusion gun.

(c) Temporary access structures and working platforms

Where necessary the contractor shall provide specialist additional safe temporary access structures and working platforms at each location for grouting or crack preparation and injection procedures. Provision for general access and work platforms shall be in accordance with Section 12 100.

The temporary structures and platforms must be stable and of sufficient strength and rigidity to safely carry all imposed temporary loads arising from the work activity.

12 405 CONSTRUCTION

(a) Grouting

(i) Preparation of contact surfaces

Concrete contact surfaces shall be prepared by removing all surface laitance and damaged, loose and soft concrete, concrete containing aggressive ions, e.g. chloride, as well as cleaning the surfaces of all foreign adherents and impregnants such as oil, paint, grease, curing compounds, dirt, etc. The contact surface shall be treated to expose the sound substrate by means of chiselling, grit blasting or high-pressure water-jetting.

The mechanically prepared surfaces shall be finally cleaned of loose dirt and dust by means of oil-free compressed air, water-jetting or vacuum cleaning, as appropriate.

(ii) Holes and pockets for embedding dowels, anchorages etc.

Pockets that are formed in concrete must be cleaned of all foreign material and prepared as for the contact surfaces in clause 12 405(a)(i) above.

Holes shall be drilled using approved mechanical equipment. The size of a drilled hole is dependant on the type of grout to be used, and as a guideline the following sizes are recommended as a minimum, based on the dowel or anchor bar diameter, D.

Table 1 : Dimensions of drill holes

Grout type	Diameter of hole	Minimum depth of hole	Direction and Inclination
Cementitious Epoxy resin	1,5 to 2,0.D 1,3 to 1,5.D	15.D 15.D	As detailed on drawings

The diameter, depth, direction and inclination of the holes required shall be as shown on the detail drawings, but shall not be less than the dimensions scheduled in Table 1. Before the holes are grouted, the dowel bars, anchors, etc shall be cleaned, and all water, concrete and residue and other foreign material shall be blown out of the hole with compressed air.

(iii) Pre-soaking

The use of a cementitious compound requires the pre-soaking of the concrete substrate with water several hours prior to grouting. All free water shall however be removed from the surface and holes or pockets immediately prior to grouting.

The use of an epoxy or polyester resin grout usually requires a clean and substantially dry contact surface. No pre-soaking is required unless specified by the grout manufacturer.

(iv) Formwork

Temporary formwork to place and contain the fluid grout may be required. Reference shall be made to the manufacturer's recommendations regarding flow distance based on the gap width and the fluid head at the pouring side. The unrestrained or exposed surface area of the grout shall not extend more than 50 mm beyond the perimeter of the smaller contact surface. The formwork shall be constructed to be leakproof to prevent wastage and loss of material.

(v) Batching and mixing

The proprietary grout shall be batched and mixed strictly in accordance with the manufacturer's instructions and specifications.

Unless otherwise specified, the product shall be mixed thoroughly in a forced action mixer of adequate capacity. Alternatively a suitably sized container equipped with a slow-speed (400/500 rpm), high-torque rotary drill fitted with an approved paddle may be used. The liquid components shall be properly mixed to ensure a smooth uniform mix prior to adding the aggregate.

The premixed aggregate shall be added slowly to the liquid binder and mixed until an evenly coated and wet mix is obtained.

The mixing and placing capacity of equipment and labour shall be adequate and matched to enable placing operations to be carried out continuously within the recommended pot life or placement time of the product, generally within 15 minutes of mixing for cementitious grouts. The mixed product shall be passed through a suitable coarse metal screen prior to placing or pumping to remove any lumps of unmixed product.

The mixed product shall not be used after expiry of the pot life and all material unused after the placement time limit, shall be discarded. All previously mixed material shall be removed from tools and equipment prior to charging and mixing a new batch of grout.

(vi) Placement of grout for bedding or gap filling

The mixed grout shall be placed within the placement life or pot life of the material in accordance with the manufacturer's instructions regarding specific placement recommendations and procedures.

In general, continuous grout flow is essential, hence sufficient mixed grout shall be available prior to commencing placement, and the rate of placing a batch shall be matched to the time taken to batch and mix a new batch.

Placement shall take place at one end of a gap to ensure continuous flow through the gap expelling all air from the exit opening. A sufficient grout head shall be maintained at the inlet end to ensure a continuous grout front through the gap.

For an epoxy grout a single batch shall not exceed 30 l of mixed material. For large batches of cementitious grout, placing by pump may be considered.

(vii) Grouting of dowel bars and anchors into holes and pockets

The grout type and consistency used shall be suited to the application and adequate measures shall be taken to prevent grout loss from the hole or pocket during the setting period. If necessary, a thixotropic grout shall be used.

The hole or pocket shall be filled with the prepared grout making allowance for the displacement of material by the item to be embedded.

Immediately after the hole has been filled with grout to the determined level, the embedment object shall be inserted slowly into the hole with a rotary motion so as to displace the grout without incurring over-displacement, which may leave the hole not full, and ensuring complete wetting of the object and the concrete faces.

Precautions shall be taken to ensure that the hole is completely filled and no air is entrapped.

The embedded object shall not be disturbed until the bond is effective, and the necessary support shall be provided to hold the object firmly in position until the grout has gained sufficient strength.

viii) Protection and curing

The exposed grout surfaces which are not cut back shall be protected from wind, rain and high temperature which can cause rapid drying out in cementitious grouts.

Cementitious grouts shall be thoroughly cured by means of an approved curing compound and procedure suitable for the product.

(b) Crack Injection

All work related to the injection of cracks with epoxy shall be executed in accordance with the approved method statement as confirmed by site tests according to clause 12 406(a).

(i) Extent and sequence of work

The extent of work will be indicated by the engineer and no work may commence unless instructed by the engineer. The extent of the actual work may vary very significantly from that indicated in the schedule of quantities and the contractor is advised to discuss the extent of the work with the engineer at the outset of the contract before establishing the necessary personnel, equipment or plant on site.

Following the erection of the necessary temporary access and working platforms at the work location, the engineer, assisted by the contractor, shall undertake a detailed inspection of the existing concrete surfaces to identify cracks requiring epoxy injection. The engineer shall then issue an instruction to the contractor detailing the extent and nature of the work. In general, only cracks exhibiting a surface crack width exceeding 0,2 mm shall be injected unless instructed to the contrary.

(ii) Crack Preparation

All surfaces within 50 mm of a crack line shall be thoroughly cleaned of all foreign material likely to impair the bond of the surface sealant to the concrete by high-pressure water-jetting, wet grit blasting or other approved mechanical means. All loose spalls and foreign materials within the crack shall be similarly removed followed by final cleaning with clean, oil-free compressed air. The concrete surface and crack shall be allowed to dry out completely and finally cleaned before commencing with crack sealing and injection.

(iii) Surface sealing and injection port installation

The whole surface of the crack shall be temporarily sealed with an approved epoxy surface sealant. The type of temporary sealant used shall be such that it can be removed without causing damage to or defacement of the concrete surface.

Approved injection ports shall be properly spaced along cracks, but shall not be drilled and fixed directly into the crack. The injection ports shall be located over the cracks using the locating wire and the locating end shall be firmly sealed and bonded to the concrete surface with a generous amount of epoxy sealant. Thereafter the crack surface between injection ports shall be sealed with an approved epoxy surface sealant band at least 3 mm thick and 30 mm wide.

While guidelines can be given for proper spacing, good judgement must be the final criterion.

Guidelines for injection port spacing in partial depth cracks are as follows:

-Spacing between injection ports should be equal to the desired depth of penetration since the resin generally travels as far into the crack as along the face of the crack. If port-to-port travel at this spacing is not obtained, intermediate injection ports must be established.

-If the cracks are less than 0,20 mm wide, injection ports should not be spaced more than 150 mm apart.

-If the cracks are more than 0,6 mm in depth, full penetration may be difficult to achieve because of equipment limitations. Intermediate ports should be established to monitor the flow of epoxy.

Guidelines for injection port spacing in cracks extending the full depth of the member are as follows:

-Members up to 0,3 m thick

For members 0,3 m or less in thickness, injection ports should be placed in the crack on one side only and spaced at the thickness of the member.

-Members 0,3 m to 0,6 m thick

For members 0,3 m to 0,6 m in thickness, injection ports should be placed in the crack on all available sides and spaced no more than the thickness of the member.

-Members over 0,6 m thick

For members greater than 0,6 m in thickness, injection ports should be placed in the crack on all available sides and spaced according to the guidelines set forth for the partial depth cracks.

The first and last injection ports must be established at either end of a crack in a member.

(iv) Epoxy resin injection

Either the pressure injection or vacuum impregnation technique of crack injection shall be used.

The epoxy surface sealant shall have cured fully before commencing with any crack injection.

All traces of cleaning solvent and air shall be expelled from the injection gun prior to commencing with crack injection.

Using an automatic epoxy mixing gun, the epoxy resin shall be injected in such a way that there is a steady displacement of air and moisture from within the crack. Starting from the lowest injection port at one end, the epoxy resin shall be injected until resin flows out of the next injection port. The upper injection port is closed and the process of injecting the epoxy resin is continued briefly. A steady injection pressure shall be maintained, however at no stage shall the pressure exceed 1,0 MPa.

The gun shall then be moved to the injection port where the resin has flowed out and the procedure is repeated for the length of the crack. After the crack is filled, and not longer than 30 minutes after the work has begun, another attempt shall be made to inject more resin, starting at the first port.

Before injection work starts, a rough calculation shall have been made as to the amount of resin required to fill the crack. If consumption exceeds the estimated quantity by more than three times, the matter shall be referred back to the engineer for investigation.

At all cracks, contact surface or repaired cavities, epoxy injection shall commence at the lowest injection point and at one end, and shall in all cases be executed such that there is a steady displacement of air, residual moisture and fine material from the void being injected.

During the entire injection operation, the sealing lines (on both sides in the case of full depth cracks) and adjacent concrete surfaces shall be inspected for any signs of leakage of epoxy and, if observed, the injection shall be stopped and the leaking region sealed or resealed.

Further injection shall recommence only once the epoxy sealant repair has cured sufficiently. Accurate and complete records shall be kept of the amount of epoxy injected into each crack, contact surface or repaired cavity together with any leakage that may have occurred during the injection operation.

After satisfactory completion of the pressure injection at any particular location and the full curing period of the epoxy injection material, the injection points and all epoxy sealant shall be removed by careful heating using a propane torch, allowing the epoxy to soften (i.e. above 130 degree Celsius). The softened epoxy material shall be scraped off and any remnants finished off using a rubbing stone and water to achieve a smooth, clean surface. Under no circumstances shall the injection ports be struck off, or the epoxy seam mechanically removed, as these actions may damage the concrete surface.

Where the crack is chased out, the chase should be filled with an approved repair material and finished flush with the concrete surface.

The repair systems for crack filling shall be either:

A. Repair System 1:	
Shrinkage compensated cementitious repair mortar/grout	SikaGrout 212
Pourable Epoxy Grout	Sikadur 42 ZA
Repair Mortar	Sika MonoTop 615HB and Sika MonoTop 612
Grouting Dowel bars	Fischer FIS-V injection mortar
	ABE Epidermix 395
B. Repair System 2:	Alternative as proposed by the contractor

The contractor shall submit details of Repair System 2 to the engineer for approval during the tender period

12 406 TESTING

(a) Site tests

The contractor shall ensure that only approved materials for the proposed crack injection process are used. Preconstruction site tests to confirm proposed work procedures shall be undertaken in accordance with this specification and the approved preliminary method statement. Any variation to procedures or material usage arising from site test results shall be incorporated into the approved final method statement. Further site tests to confirm revised procedures or material use, and test coring to confirm crack penetration and sealing quality shall be at the discretion of the engineer.

12 407 MEASUREMENT AND PAYMENT

Payment for items in this section shall include full compensation for all work associated with grouting and crack injection of concrete structures which are not already covered by the measurement and payment items of the COLTO Standard Specification or the Project Specification such as procurement, transport, additional access and temporary works and plant and equipment required to undertake the work as specified. General access, work platforms and associated temporary works shall be measured in Section 12 100.

The quantities indicated in the Schedule of Quantities Section 12 400 are based on inspections performed as part of the preliminary and detail design phases increased to allow for defects that were not identified. The actual work done may vary significantly from the scheduled quantities and the contractor shall be deemed to have allowed in his tendered rates for such variations as can be reasonably expected.

Item		**Unit**
124.02	**Grouting for**:	
	(b) Gap filling (type, thickness and size indicated) to (description)	litre (l)

The unit of measurement shall be the volume of grout used measured in situ according to the sizes indicated on the drawings.

The tendered rate shall include full compensation for all labour, material, plant and equipment as well as all work and incidentals required to supply, mix, place and cure the grout in position including any temporary formwork, support and control measures as necessary to assist the placement procedure.

Item		Unit
124.03	Fixing of dowel bars and anchors into:	
	(a) holes (hole, diameter and depth stated) in (description of member)	number (No)

The unit of measurement shall be the number of dowel bars or anchors installed into holes or pockets as specified.

The tendered rate shall include full compensation for all labour, material, plant and equipment as well as for all work and incidentals required to install each item as detailed on the drawings including all drilling and cleaning of holes, preparation and forming of pockets, supplying, placing and curing of grout and the installation, support and treatment of each item as indicated.

Item		Unit
124.06	Crack injection with epoxy resin to (location)	litre (l)

The unit of measurement shall be the litre (l).

The tendered rate shall include full compensation for all labour, materials, equipment and plant as well as for all work and incidentals required to prepare, isolate, caulk and inject to full or partial depth as specified by the engineer and cure the designated crack paths (including for wastage) all in accordance with the project specification and the repair material manufacturer's procedures, methods and specifications.

SECTION 12 600: PROTECTIVE COATINGS AND TREATMENTS FOR CONCRETE

12 601 SCOPE

This section covers the material, equipment and work required for applying protective coatings and treatments to concrete surfaces.

12 602 INTERPRETATION

(a) Supporting Specification

The following specifications shall be read with and shall form part of the contract:

(i) Project Specification
(ii) COLTO Standard Specifications for Road and Bridge Works (1998).

12 603 MATERIALS

(f) Carbonation inhibitor barrier coatings

An approved carbonation inhibitor barrier coating shall comply with the following criteria:

(i) Present a uniform appearance with the final colour to be decided by the engineer
(ii) Provide barrier protection against ingress of water, oxygen and carbon dioxide
(iii) Permit the passage of water vapour
(iv) Resist the deleterious effects of UV light
(v) Weather such that only minimal surface preparation is required when overcoating
(vi) Adhere strongly to concrete and repair materials
(vii) Bridge minor cracks and have flexibility to accommodate small movement
(viii) Provide a 10 year guarantee against coating failure and UV degradation
(ix) Supply a specification for surface preparation and application of overcoating after a 10 year period

The coating material will be deemed to meet the requirements of (b) and (c) with respect to water, oxygen, water vapour and carbon dioxide barrier protection if it complies with the following specification:

-The product of the minimum dry film thickness of the coating (microns) and the carbon dioxide diffusion resistance coefficient shall exceed 50m

-The cured coating shall reduce the water absorption of good quality 30MPa concrete by a factor of at least 20

-The product of the average dry film thickness of the coating (microns) and the water vapour diffusion resistance coefficient shall not exceed 4m

In the event that a multi-layer and / or a multi-product system is proposed criteria (i)

(ii) and (iii) shall apply to the complete system acting as a combined barrier coating.

12 604 PLANT AND EQUIPMENT

(a) General

All plant and equipment used for pressure cleaning and protective treatment application shall be based on proven technology and practice, and shall be maintained in a clean and good working order. The equipment shall be inspected, serviced and calibrated at regular intervals and tested to ensure that the system functions efficiently and accurately, all to the satisfaction of the engineer.

(a) High-pressure water-jetting equipment

The type and capacity of the water-jetting equipment, delivery hoses and nozzles shall be capable of delivering at least 1000 kPa water pressure through nozzles which shall at least remove curing compounds or membranes and shutter release compounds without producing an exposed aggregate finish.

(d) Access structures and working platforms

Where necessary the contractor shall provide suitable and safe measures at each location for pressure cleaning and surface coating. These provisions shall be deemed to form part of the access for bridge rehabilitation as specified in Section 12 100.

12 605 CONSTRUCTION

(a) Storing of materials

The contractor shall provide a lock-up store for the repair materials and observe all storage requirements and safety precautions recommended by the materials manufacturers.

(b) Surface preparation

Shall be prepared strictly in accordance with the materials manufacturer's instructions. The preparation shall include for everything that is necessary to prepare the surface to receive the protective coatings and / or treatments.

The contractor shall ensure that technical representatives, appointed or employed by the materials suppliers, carry out regular inspections of the preparation work and provide written confirmation that the work is in accordance with the materials suppliers requirements. The reports shall be specific and definitive, generalised statements will not be acceptable.

Where surface preparation is found by the technical representatives to be inadequate the report shall contain specific advice to enable the contractor to attain a required standard.

The contractor shall provide the engineer with copies of all technical inspection reports before any surface treatment or protective coatings is applied to a bridge element. Where the time between surface preparation and treatment exceeds two days and / or during windy and / or wet weather the prepared surfaces shall be re inspected and approved by the technical representative.

The moisture content of patch repair areas must be specifically checked by the technical representative to ensure that moisture-sensitive coatings are not applied over surfaces that contain excessive moisture.

(c) Batching and mixing

Mixing equipment, mixing times, working life and overcoating times shall conform to the manufacturer's recommendations taking into account the temperature at time of application.

Treatment materials shall be mixed (if applicable) and applied strictly in accordance with the manufacturer's specifications. Thinning or diluting shall not be permitted without the approval of the engineer.

(d) Protective surface treatment

Surface treatment or coatings may consist of a system of several coats of more than one type of coating. Where such a system is applied, the various components shall be compatible and preferably from one manufacturer.

Protective treatments shall be applied to all of the exposed concrete surface as indicated. Items or areas which are not to be coated, shall be suitably protected or masked before application of the treatment.

(i) Application of surface coatings

All protective coatings and treatments for concrete shall be stored, mixed and applied strictly in accordance with the product manufacture's specifications and the project specifications.

All surface coating materials shall be handled, mixed and applied strictly in accordance with the manufacture's specification. The contractor shall take particular care to identify & mange his surface coating material stock such that one manufacture batch is utilised for the final coat of each structure. For cementitious look coatings, the contractor shall carefully plan his coating application sequence to minimise and prevent obvious discrepancies in the appearance and or colour of the cured coating material.

(ii) Application rate records

Records of application rates shall be submitted by the contractor to the engineer on a daily basis indicating batch numbers, the area covered by each coat and the quantity of coating material used. Only material from the same batch shall be used for any continuous, visible, unbroken surface to attain uniformity of colour and texture on the concrete surface.

(iii) Trial sample panels

Protective treatment shall not be applied until trial sample panels of the protective treatment have been prepared by the contractor and approved by the engineer and the material suppliers technical representative.

The contractor shall prepare the sample panels using the same surface preparation mixing and batching equipment, application technique, application rate and under the same climatic conditions he intends to treat the whole structure. The position of the trial sample panels are subject to the engineer's approval.

Product manufacturers of coating products are required to inspect, assist and finally approve (in writing) all aspects of surface preparation and product application employed on the trial sample panel.

The trial sample shall be used as a standard against which the rest of the work will be judged and shall be maintained intact until all other coating work is complete.

(iv) Proprietary protective surface coatings

The suitability of the protective surface coating for a particular application shall be proved by testing and submission of an approved industry track record of usage under similar circumstances.

The contractor shall submit details of proprietary protective surface coatings to the engineer for approval prior to its use in the permanent works.

The proprietary surface coating systems shall be:

A.	Repair System 1: Semi-rigid Protective Coating	 SikaTop-Seal 107
B.	Repair System 2:	Alternative as proposed by the contractor The contractor shall submit details of Repair System 2 to the engineer for approval during the tender period.

All surface coating materials shall be handled, mixed and applied strictly in accordance with the manufacture's specification. The contractor shall take particular care to identify & mange his

surface coating material stock such that one manufacture batch is utilised for the final coat of each structure. For cementitious-look coatings, the contractor shall carefully plan his coating application sequence to minimise and prevent obvious discrepancies in the appearance and or colour of the cured coating material.

(e) Health and Safety precautions

The contractor shall observe the health and safety precautions recommended by the manufacturer regarding the handling and the disposal of unused material and containers.

The contractor shall ensure that natural water streams or rivers are not polluted by protective treatment material under any circumstances.

12 606 TESTING

The contractor shall ensure that only compatible materials are used for the surface treatment or protective coatings.

The test results shall be reported to the engineer and will be subject to the engineer's approval.

12 607 MEASUREMENT AND PAYMENT

Payment for items in this section shall include full compensation for all works associated with the execution of the work and quality assurance procedures which are not separately covered by the measurement and payment items of the Standard Specifications or the Project Specifications. General access and work platforms and associated temporary works are covered in Section 12 100.

All work and material for which no specific pay item is defined shall be deemed to be covered by the items in this section.

Item		Unit
126.01	**Cleaning and preparation of concrete surface** (Method and surface finish indicated)	square metre (m^2)

This item covers concrete areas that will not be treated with protective coatings and treatments.

The unit of measurement shall be the square metre of surface area cleaned by the method indicated.

The tendered rate shall include full compensation for all material, plant and equipment, all labour and incidentals required to execute the work as specified.

Item		Unit
126.02	**Application of protective coatings and treatments** (Type and application rate indicated)	square metre (m^2)

The unit of measurement shall be the square metre of surface area to be protected or treated as specified. For payment purposes, the surface area shall be measured once only irrespective of the number of layers of protective coatings and / or applications of surface treatment is required to achieve the specified application rate.

The tendered rate shall include full compensation for all surface preparations (using water jetting min 250-bar), labour, materials, equipment, additional safety measures, storage, mixing and applications of the protective coatings and treatments, protection of the coating and treatments from the adverse effects of environmental exposure (sun, wind and precipitation) until full cure of the material is achieved, cleaning and disposal of unused or rejected material and all incidentals necessary to execute the work (including wastage) as specified, all to the satisfaction of the engineer.

Item		Unit
126.03	**Trial sample panels**	square metre (m^2)

The unit of measurement shall be the square metre surface area of successful and accepted trail sample panels to be treated. For payment purposes, the surface area shall be measured once only, irrespective of the number of applications of material and attempts required to achieve an acceptable sample with the specified application rate.

The tendered rate shall include full compensation for everything that is necessary to prepare an acceptable sample panel.

3.4.4 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.

3.4.5 LOCAL PRODUCTION AND CONTENT

The Contractor will be required to comply with all requirements as stated in this document.

3.4.6 EMPLOYMENT OF SECURITY PERSONNEL

All security staff employed by the contractor on behalf of the CCT or at any CCT property must be registered with Private Security Industry Regulatory Authority (PSiRA). Proof of such registration must be made available to the employer's agent upon request.

3.4.7 UNIVERSAL ACCESS

In pursuit of becoming a fully accessible city, the City of Cape Town expects all Consultants and Service Providers to design and construct to SANS Standards for accessible Design, and any relevant City of Cape Town documents as may be relevant, and to exhibit a commitment to employing Universal Design Principles in their design, construction, service and product delivery of construction projects. This applies to all projects whether new, temporary, upgrades or rehabilitation works.

The contractor will engage with project representatives and the CCT's Universal Accessibility Department on how Universal Design Principles will enhance accessibility, within this project, that meets a variety of needs and creates a city that is accessible to everyone.

C3.5 Management

CONTENTS

3.5.1. FORMS FOR CONTRACT ADMINISTRATION

The Contractor shall complete, sign and submit with each monthly statement for payment, the following updated returns (the format of which are attached in C3.6 Annexes as amended from time to time):

a) Monthly Project Labour Report (Annex 1)
b) B-BBEE Sub-contract Expenditure Report (Annex 2)
c) Joint Venture Expenditure Report (Annex 3)
d) Targeted Labour Contract Participation Expenditure Report (Annex 4)
e) Targeted Enterprises Contract Participation Expenditure Report (Annex 5)

The Monthly Project Labour Report must include details of all labour (including that of sub-contractors) that are South African citizens earning less than **R450.00** per day, as adjusted from time to time (excluding any benefits), who are employed on a temporary or contract basis on this contract in the month in question.

In addition to the Monthly Project Labour Report the Contractor shall simultaneously furnish the Employer's Agent with copies of the signed employment contracts entered into with such labour, together with certified copies of identification documents, proof of attendance in the form of attendance register or timesheets as well as evidence of payments to such labour in the form of copies of payslips or payroll runs. If the worker is paid in cash or by cheque, this information must be recorded on the envelope and the worker must acknowledge receipt of payment by signing for it and proof of such acknowledgement shall be furnished to the Employer's Agent.

The Monthly Project Labour Reports shall be completed and submitted in accordance with the instructions therein and copies of all submitted documents must be kept on site be made available to the employer's agent upon request.

The **B-BBEE Sub-contract Expenditure Report** is required for monitoring the prime contactor's compliance with the sub-contracting conditions of the **Preference Schedule**.

The Joint Venture Expenditure Report is required for monitoring the joint venture's compliance with the percentage contributions of the JV partners as tendered, where the joint venture has been awarded preference points in respect of its consolidated B-BBEE scorecard.

The Targeted Labour Contract Participation Expenditure Report (if applicable) is required for monitoring the contractor's compliance for achieving the specified minimum targeted labour contract participation goal (CPG_L) and, if applicable, for calculating any penalty in terms thereof.

The Targeted Enterprises Contract Participation Expenditure Report (if applicable) is required for monitoring the contractor's compliance for achieving the specified minimum targeted enterprises contract participation goal (CPG_E) and, if applicable, for calculating any penalty in terms thereof.

The Expenditure Reports shall be verified by the Employer's Agent/Employer's Agent's Representative.

In respect of Annexes 2 and 3, the Employer shall, in addition to any other sanctions available to it , apply the financial penalties applicable to breach of preferencing conditions in the **Preference Schedule** Preference Schedule in Part T2.2 Returnable Schedules. In the case of joint ventures (Annex 3), the

contractor shall prove his compliance with item 6) in Section 2 of the Preference Schedule by providing a consolidated scorecard at his own cost on instruction from the Employer's Agent.

3.5.2 PARTICIPATION OF TARGETED LABOUR

3.5.2.1 Minimum targeted labour contract participation goal

NOT USED

3.5.3. COMMUNITY LIAISON OFFICER

NOT USED

3.5.4. PARTICIPATION OF TARGETED ENTERPRISES

NOT USED

3.5.5. ENVIRONMENTAL MANAGEMENT PROGRAMME

Particular Specification E: Environmental Management Specification and its Annexures are attached hereto.

3.5.6. HEALTH AND SAFETY

Particular Specification H: Health and Safety Specification is attached hereto.

E: ENVIRONMENTAL MANAGEMENT SPECIFICATION

CONTENTS

E: ENVIRONMENTAL MANAGEMENT SPECIFICATION

For use with the General Conditions of Contract for Construction Works, Third Edition, 2015.

E1 SCOPE

The Environmental Management Programme (EMP) for the project is comprised of this Environmental Management (EM) Specification and its Annexures, including the "Additional environmental issues deemed to form part of the Environmental Management Specification" attached as Annexure D hereto, which together cover the requirements for controlling the impact on the environment of construction activities.

E2 INTERPRETATIONS

E2.1 Supporting specifications

The following standardised specification shall, *inter alia*, apply to this Contract:

a) SANS 1200A, as may be varied or added to in the Scope of Work

E2.2 Application

This EM Specification contains clauses that are generally applicable to the undertaking of construction works in areas where it is necessary to impose pro-active controls on the extent to which the construction activities impact on the environment.

E2.3

In the event of any difference or discrepancy between the provisions of the Standardised Specifications and the provisions of the EM Specification, the latter shall prevail.

E2.4 Definitions and abbreviations

For the purposes of this EM Specification the following definitions and abbreviations shall apply:

E2.4.1 Environment

The surroundings within which humans exist and that are made up of –

a) the land, water and atmosphere of the earth;
b) micro-organisms, plant and animal life;
c) any part or combination of i) and ii) and the interrelationships among and between them; and
d) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

E2.4.2 Potentially hazardous substance

E2.4.3 A substance which, in the reasonable opinion of the Employer's Agent, can have a deleterious effect on the environment.

E2.4.4 Method Statement

A written submission by the Contractor to the Employer's Agent in response to the EM Specification or a request by the Employer's Agent, setting out the plant, materials, labour and method the Contractor proposes using to carry out an activity, in such detail that the Employer's Agent is enabled to assess whether the Contractor's proposal is in accordance with the Scope of Work and/or will produce results in accordance with the EM Specification.

E2.4.5 Reasonable

Unless the context indicates otherwise, means reasonable in the opinion of the Employer's Agent after he has consulted with a person suitably experienced in "environmental implementation plans" and "environmental management plans" (both as defined in the National Environmental Management Act, 107 of 1998).

E2.4.6
E2.4.7 Solid waste

All solid waste, including construction debris, chemical waste, excess cement/ concrete, wrapping materials, timber, tins and cans, drums, wire, nails, domestic waste, dead vegetation, asphalt products, etc.

E2.4.8 Contaminated water

Water contaminated by the Contractor's activities containing cements, concrete, lime, paint products, thinners, turpentine, chemicals, fuels, oils washing detergents, etc.

E2.4.9 Working area

Any area within the boundaries of the Site where construction is taking place.

E2.4.10 Contractor's camp or construction camp

The area designated for all temporary site offices, storage areas, construction plant parking areas, staff welfare facilities, etc.

E2.4.11 Employer's Agent

The person/firm so named in the Contract Data, whose function is to administer the Contract as agent of the Employer.

E2.4.12 Employer's Agent's Representative (ER)

The natural person appointed by the Employer's Agent in terms of the Contract, who shall observe the execution of the Works, examine and test materials and workmanship, and deliver and receive communications to/from the Contractor.

E2.4.13 Environmental Officer (EO)

Appointed by the Employer's Agent as his environmental representative on Site, with the mandate to enforce compliance with the EMP. The duties of the EO are stipulated in the City's guideline document for the EO and ER.

E2.4.14 Environmental Control Officer (ECO)

An independent appointment to objectively monitor implementation of relevant environmental legislation, conditions of Environmental Authorisations (EAs), and the EMP for the project.

E2.4.15 Environmental Site Officer (ESO)

Employed by the Contractor as his environmental representative to monitor, review and verify compliance with the EMP by the Contractor. The ESO must ensure that he is involved at all phases of the construction (from site clearance to rehabilitation).

E2.4.16 Abbreviations

The following abbreviations occur in this EM Specification:

EMP - Environmental Management Programme
EM Specification – Environmental Management Specification
EO - Environmental Officer
ECO – Environmental Control Officer
ESO – Environmental Site Officer
ER – Employer's Agent's Representative
MSDS - Material Safety Data Sheets

E2.5 Employer's Agent's authority to delegate

In terms of Clause 3.2.4 of the General Conditions of Contract, Third Edition, 2015 (GCC 2015), the Employer's Agent has the authority to appoint a representative. Other than the Employer's Agent's Representative (ER) in terms of Clause 3.2, this can be in the form of an Environmental Officer (EO), who shall be responsible for monitoring compliance with the EMP. All instructions given by the EO shall go through the ER, who will then convey these to the Contractor, except in the case of an environmental emergency, in which case the EO can issue an instruction directly to the Contractor. An environmental emergency is one which, in the opinion of the EO, would cause serious environmental harm if not addressed immediately.

Depending on the nature/environmental sensitivity of the Contract the following variations in the organisational structure are possible:

a) The ER may work together with an EO; or
b) There may be an ER only (for construction projects with low potential for causing significant environmental impacts). In this case the ER has responsibility for the EO's functions.
c) There may be an independently appointed Environmental Control Officer (ECO) who will fulfil essentially the same functions as the EO. The ECO may work with just the ER (if there is no EO) or may work with both the ER and EO.

The term "Employer's Agent" in this EM Specification refers to the Employer's Agent as defined in Clause E2.3.9 acting through the ER/EO/ECO as delegated.

E3 MATERIALS

E3.1 Materials handling, use and storage

The Contractor shall ensure that any delivery drivers are informed of all procedures and restrictions (including "no go" areas) required to comply with the EM Specification. The Contractor shall ensure that these delivery drivers are supervised during off loading by someone with an adequate understanding of the requirements of the EM Specification.

Materials shall be appropriately secured to ensure safe passage between destinations. Loads, including but not limited to, sand, stone chip, fine vegetation, refuse, paper and cement, shall have appropriate cover to prevent them spilling from the vehicle during transit. The Contractor shall be responsible for any clean-up resulting from the failure by his employees or suppliers to properly secure transported materials.

All manufactured and or imported materials shall, where reasonably possible, be stored within the Contractor's camp and, if so required by the Employer's Agent, out of the rain. The location and method of protection of such materials stored outside of the Contractor's camp and the method of rehabilitation of these areas, shall be subject to the Employer's Agent's approval.

Stockpile areas shall be approved by the Employer's Agent before any stockpiling commences.

E3.2 Hazardous substances

Hazardous chemical substances (as defined in the Regulations for Hazardous Chemical Substances in GN 1179 (25 August 1995)) stored on Site for use during construction shall be stored in secondary containers which are clearly and appropriately marked/signed. The relevant Material Safety Data Sheets (MSDS) shall be available on Site. Procedures detailed in the MSDSes shall be followed in the event of an emergency situation.

If potentially hazardous substances are to be stored on Site, the Contractor shall inform the Employer's Agent of such substances and provide a Method Statement detailing the substances/ materials to be used, together with the storage, handling and disposal procedures of the materials. Hazardous substances shall be stored out of flood risk areas and disposal of these substances shall be at a licensed waste disposal facility.

E4 PLANT (referring to "Construction Equipment" as defined in GCC 2015, and the Contractor's facilities as used in SANS 1200A)

E4.1 Fuel (petrol and diesel) and oil

E4.1.1 Storage

If fuel and oil is to be stored on Site, then the Contractor shall submit a Method Statement covering the procedures for dealing with accidental hydrocarbon spillage and leaks, and detailing how these liquids will be stored, handled and disposed of.

The Employer's Agent shall approve the location of all fuel storage areas. All necessary approvals with respect to fuel storage and dispensing shall be obtained from the appropriate authorities. Symbolic safety signs depicting **"No Smoking", "No Naked Lights"** and **"Danger"** conforming to the requirement of SANS 1186 are to be prominently displayed in and around the fuel storage area. There shall be adequate fire-fighting equipment at the fuel storage area.

The Contractor shall ensure that all liquid fuels and oils are stored in tanks with lids, which are kept firmly shut and adequately secured. The capacity of the tank shall be clearly displayed and the product contained within the tank clearly identified using the emergency information system detailed in SANS 0232 part 1. Fuel storage tanks shall have a capacity not exceeding 9000 litres and shall be kept on site only for as long as fuel is needed for construction activities, on completion of which they shall be removed.

The tanks shall be situated on a smooth impermeable base with an earth bund. The volume inside the bund shall be 110% of the total capacity of the largest storage tank. The base may be constructed of concrete, or of plastic sheeting with impermeable joints, covered by a layer of compacted earth to protect the sheeting. The impermeable lining shall extend to the crest of the bund. The floor of the storage area shall be sloped to enable any spilled fuel and/or fuel-contaminated water to be removed easily.

If any rainwater collects in the bunded areas, it shall be promptly removed and taken off Site to a disposal site approved by the Employer's Agent.

Only empty and externally clean tanks may be stored on the bare ground. Empty and externally dirty tanks shall be sealed and stored on an area where the ground has been protected.

Adequate precautions shall be provided to prevent spillage during the filling of any tank and during the dispensing of the contents. If fuel is dispensed from 200 litre drums, the proper dispensing equipment shall be used, and the drum shall not be tipped in order to dispense fuel. The dispensing mechanism for the fuel storage tanks shall be stored in a waterproof container when not in use.

E4.1.2 Refuelling

Plant shall be refuelled at a designated refuelling area approved by the Employer's Agent. The surface under the temporary refuelling area shall be protected against pollution to the reasonable satisfaction of the Employer's Agent prior to any refuelling activities. The Contractor shall ensure that there is always a supply of absorbent material (e.g. Spill Sorb or Enretech #1 powder or equivalent) readily available that is designed to absorb, break down and encapsulate minor hydrocarbon spillage. The quantity of such material shall be able to handle a minimum of 200 litres of hydrocarbon liquid spill.

E4.1.3 Treatment and remediation

Treatment and remediation of hydrocarbon spill and leak areas shall be undertaken to the satisfaction of the Employer's Agent. In the event of a hydrocarbon spill the source of the spillage shall be isolated and the spillage contained.

E4.2 Ablution and toilet facilities

Washing, whether of the person or of personal effects, defecating and urinating are strictly prohibited other than at the facilities provided.

The Contractor shall provide ablution facilities for all personnel employed on the Site, including shelter, toilets and washing facilities. The Contractor's personnel will not be permitted to use the City's ablution facilities.

Toilet facilities provided by the Contractor shall occur in a ratio of not less than 1 toilet per 30 workers (1:15 is preferred) for each sex. Toilet facilities shall be located within the Contractor's camp, but also at work areas remote from the camp, all to the satisfaction of the Employer's Agent. All portable toilets shall be adequately secured to the ground to prevent them toppling over as a result of wind or any other cause.

The Contractor shall ensure that the entrances to these toilets are adequately screened from view, that they are maintained in a hygienic state, serviced regularly, that no spillage occurs when they are cleaned and that

contents are removed from Site. Toilets shall also be emptied before any temporary site closure for a period exceeding one week. Discharge of waste from toilets into the environment and burial of waste is strictly prohibited. The Contractor shall provide toilet paper at all times.

No ablution facilities shall be located closer than 50m to any water body

A Method Statement shall be provided by the Contractor detailing the provision, location, and maintenance of ablution facilities.

E4.3 Eating areas

The Contractor shall designate eating areas within the approved Contractor's camp. The feeding of, or leaving of food for, animals is strictly prohibited. Sufficient bins, as specified in Clause E4.4 below, shall be present in these areas.

Any cooking on Site shall be done on well-maintained gas cookers with fire extinguishers present. No open fires for cooking purposes shall be permitted, unless for occasional use in facilities specifically provided for this purpose and within the confines of the Contractor's camp.

E4.4 Solid waste management

E4.4.1 Litter and refuse

The site shall be kept neat and clean at all times, littering is prohibited.

No on-site burying or dumping of any waste materials, vegetation, litter or refuse shall occur. The Contractor shall provide scavenger and weatherproof bins with lids, of sufficient number and capacity to store the solid waste produced on a daily basis. The lids shall be kept firmly on the bins at all times. Bins shall not be allowed to become overfull and shall be emptied regularly, at least once a week. Waste from bins may be temporarily stored on Site in a central waste area that is weatherproof and scavenger-proof, and which the Employer's Agent has approved. Wherever possible refuse shall be recycled, and containers for glass, paper, metals and plastics shall be provided and the contents delivered to suitable recycling facilities when necessary.

All other litter and refuse shall be disposed of off Site at an approved landfill site. The Contractor shall supply the Employer's Agent with a certificate of disposal.

E4.4.2 Construction waste

Where possible all construction waste or spoil material shall be recycled, either on Site or elsewhere. As a last resort all construction waste shall be disposed of off Site at an approved landfill site. The Contractor shall supply the Employer's Agent with a certificate of disposal.

E4.5 Contaminated water management

Potential pollutants of any kind and in any form shall be kept, stored, and used in such a manner that any spill or escape can be contained and the water table and/or any adjacent water courses or bodies are not endangered. Spill kits which can be used to contain and/or mop up spills shall be available. Water containing such pollutants as cements, concrete, lime, chemicals, oils and fuels shall be discharged into a conservancy tank for removal from the Site to a licensed disposal facility. This particularly applies to water emanating from concrete batching plants and to runoff from fuel storage, refuelling or construction equipment washing areas. Wash down areas shall be placed and constructed in such a manner so as to ensure that the surrounding areas are not polluted.

No paint products, chemical additives and cleaners, such as thinners and turpentine, may be disposed of into the stormwater system or elsewhere on Site. Brush/roller wash facilities shall be established to the satisfaction of the Employer's Agent.

A Method Statement shall be provided by the Contractor detailing the management of contaminated water.

Should contaminated water be released into the environment, specifically into a water course, monitoring thereof shall commence in accordance to the National Water Act, 36 of 1998, Section 21(f) – refer to GN 399 (26 March 2004). Contaminated water must not be released into the environment without authorisation from the relevant authority.

The Contractor shall notify the Employer's Agent immediately of any pollution incidents on Site and, at his own cost, take all reasonable measures to contain and minimise the effects of the pollution.

Any rehabilitation of the environment required as a result of such pollution shall be carried out by the Contractor at his own cost in accordance with a Method Statement approved by the Employer's Agent.

E4.6 Site structures

The type and colour of roofing and cladding materials to the Contractor's temporary structures shall be selected to reduce the visual impact.

E4.7 Lights

The Contractor shall ensure that any lighting installed on the Site for his activities does not cause a reasonably avoidable disturbance to other users of the surrounding area.

Lighting installed shall, as far as practically possible, be energy efficient. Lighting utilised on Site shall be turned off when not in use.

E4.8 Workshop, equipment maintenance and storage

No workshops or plant maintenance facilities shall be constructed on Site for performing major or routine maintenance of equipment and vehicles.

The Contractor shall ensure that in those areas where, after obtaining the Employer's Agent's approval, the Contractor carries out emergency or minor routine plant maintenance, there is no contamination of the soil, water sources or vegetation. Drip trays to collect waste oil and other lubricants shall be provided in any areas of the Site where such maintenance takes place. Drip trays must be emptied regularly and after rain, and the contents disposed of at a licensed disposal facility.

All vehicles and plant shall be kept in good working order. Leaking vehicles and plant shall be repaired immediately or removed from the Site.

The washing of vehicles and plant on Site shall be restricted to emergency or minor routine maintenance requirements only. Washing may only be undertaken in areas designated by the Employer's Agent.

E4.9 Noise

The Contractor shall limit noise levels (for example, by installing and maintaining silencers on plant). The provisions of SANS 1200A Clause 4.1 regarding "built-up areas" shall apply.

Appropriate directional and intensity settings are to be maintained on all hooters and sirens.

No amplified music shall be allowed on Site. The use of audio equipment shall not be permitted, unless the volume is kept sufficiently low so as to be unobtrusive. The Contractor shall not use sound amplification equipment on Site, unless in emergency situations.

Construction activities generating output levels of 85 dB(A) or more in residential areas, shall be confined to the hours 08h00 to 17h00 Mondays to Fridays. Should the Contractor need to do this work outside of the above times, he shall do so only with the approval of the Employer's Agent, and the surrounding communities shall be informed prior to the work taking place.

E5 CONSTRUCTION

E5.1 Method Statements

The Contractor shall submit the environmental method statements required within such reasonable time as the Employer's Agent shall specify or as required by the EM Specification. The Contractor shall not commence any activity until the Method Statement in respect thereof has been approved and shall, except in the case of emergency activities, allow a period of two weeks for consideration of the Method Statement by the Employer's Agent.

The Employer's Agent may require changes to a Method Statement if the proposal does not comply with the specification or if, in the reasonable opinion of the Employer's Agent, the proposal may result in, or carries a greater than reasonable risk of, damage to the environment in excess of that permitted by the EM Specification.

E5.2 Approved Method Statements shall be readily available on the Site and shall be communicated to all relevant personnel. The Contractor shall carry out the Works in accordance with the approved Method Statement. Approval of the Method Statement shall not absolve the Contractor from any of his obligations or responsibilities in terms of the Contract.

Changes to the way the Works are to be carried out must be reflected by amendments to the original approved Method Statements, and these amendments require the signature of both the Contractor and the Employer's Agent.

Method Statements shall consider all environmental hazards and risks identified by the Contractor and/or Employer's Agent and shall contain sufficient information and detail to enable the Employer's Agent to assess the potential negative environmental impacts associated with the proposed activity and shall cover applicable details with regard to:

a) construction procedures,
b) materials and equipment to be used,
c) getting the equipment to and from Site,
d) how the equipment/material will be moved while on Site,
e) how and where material will be stored,
f) the containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur,
g) the control of fire,
h) timing and location of activities,
i) compliance/non-compliance with the EM Specification,
j) any other information deemed necessary by the Employer's Agent.

The format to be used for the required method statements is bound in Annexure A of this EM Specification. The Contractor (and, where relevant, any sub-contractors) must also sign the Method Statement, thereby indicating that the work will be carried out according to the methodology contained in the approved Method Statement.

E5.1.1 Method Statements to be provided within 14 days from the Commencement Date

a) Layout and Preparation of Contractor's Camp (E5.4).

b) Ablution Facilities: number of, location, cleaning, method of securing to the ground, etc. of portable toilets (E4.2).

c) Solid Waste Management: number of, type, location, cleaning, method of securing to the ground, etc. of bins (E4.4).

d) Environmental Awareness Training: logistics for the environmental awareness courses for all the Contractor's management staff, as well as other employees (E5.2).

e) Emergency Procedures for Accidental Hydrocarbon Leaks and Spillages (E4.1 and E5.8).

f) Asphalt and Bitumen: details of all methods and logistics associated with the use of bitumen and asphalt (E5.11).

E5.2 Environmental Awareness Training

It is a requirement of this Contract that environmental awareness training courses are run for all personnel on Site. Two types of courses shall be run: one for the Contractor's and subcontractors' management, and one for all site staff and labourers. Courses shall be run during normal working hours at a suitable venue provided by the Contractor. All attendees shall remain for the duration of the course and sign an attendance register that clearly indicates participants' names on completion, a copy of which shall be handed to the Employer's Agent. The Contractor shall allow for sufficient sessions to train all personnel. Subsequent sessions shall be run for any new personnel coming onto Site. A Method Statement with respect to the organisation of these courses shall be submitted.

Notwithstanding the specific provisions of this clause, it is incumbent upon the Contractor to convey the spirit of the EM Specification to all personnel involved with the Works.

E5.2.1 Training Course for Management and Foremen

The environmental awareness training course for management shall include all management and foremen. The course, which shall be presented by the Employer's Agent or his designated representative, shall be of approximately one hour duration. The course shall be undertaken prior to the commencement of work on Site.

E5.2.2 Training Course for Site Staff and Labour

The environmental awareness training course for site staff and labour shall be presented by the Contractor from material provided by the Employer's Agent. The course shall be approximately one hour long. The course shall be undertaken not later than 3 working days after the commencement of work on Site, with sufficient sessions to accommodate all available personnel.

All the Contractor's employees, sub-contractors' employees and any suppliers' employees that spend more than 1 day a week or four days in a month on Site shall attend the Environmental Awareness Training Course for Site Staff and Labour

E5.3 Contractor's Environmental Representative (ESO)

The Contractor shall appoint an environmental representative, also called an Environmental Site Officer (ESO), who shall be responsible for undertaking a daily site inspection to monitor compliance with this EM Specification. The Contractor shall forward the name of the environmental representative (ESO) to the Employer's Agent for his approval. The environmental representative (ESO) shall complete Environmental Site Inspection Checklists (Annexure B attached hereto) and these shall be submitted to the Employer's Agent once a week.

E5.4 Site division, demarcation and "no go" areas

The Contractor shall restrict all his activities, materials, plant and personnel to within the Site or any particular working areas specified or indicated on the drawings.

The Contractor shall erect and maintain permanent and/or temporary fences of the type and in the locations specified elsewhere in the Scope of Work or on the drawings. Such fences shall, if so specified, be erected before undertaking any construction activities.

Where environmentally sensitive areas are specified as "no go" areas, the Contractor shall ensure that, insofar as he has the authority, no person, plant or material shall enter the "no go" areas at any time.

A Method Statement detailing the layout and method of establishment of the Contractor's camp (including all offices, shelters, eating areas, storage areas, ablution facilities and other infrastructure required for the running of the project) shall be provided.

E5.5 Access routes/ haul roads

On the Site and, if so required, within such distance of the Site as may be stated by the Employer's Agent, the Contractor shall control the movement of all vehicles and construction equipment, including that of his suppliers, so that they remain on designated routes, are distributed so as not to cause an undue concentration of traffic, and that all relevant laws are complied with. In addition, the movement of such vehicles and construction equipment shall be planned and operated so as to minimise disruption to regular users of the routes. As far as possible the Contractor shall use existing access and haul routes. Damage to existing access roads as a result of construction activities shall be repaired to the satisfaction of the Employer's Agent, using material similar to that originally used. The cost of the repairs shall be borne by the Contractor. New temporary access or haul routes may only be established with the prior approval of the Employer's Agent. The rehabilitation of such routes shall be to the Contractor's own cost and to the approval of the Employer's Agent.

Any directional signage required by the Contractor for the purposes of directing the movement of his own vehicles and construction equipment (or that of his subcontractors or suppliers) must be of a design and in a location approved by the Employer's Agent. Directional signage may not be erected in such a manner that it interferes with sight lines or pedestrian movement.

E5.6

E5.7 Construction personnel information posters

The Contractor shall erect and maintain information posters for the information of his employees, depicting actions to be taken to ensure compliance with aspects of the EM Specification. A2 information posters, printed on white vinyl, shall be erected at the eating areas and any other locations specified by the Employer's Agent.

The specification for the poster is presented in Annexure C of this EM Specification. The symbols shall be black and the circles shall be red lines. The Contractor shall ensure that the construction personnel information posters are not damaged in any way, and shall replace a poster if any part of it becomes illegible.

E5.8 Fire control

Other than for cooking purposes as specified in Clause E4.3, no fires may be lit on Site. Any fires which occur shall be reported to the Employer's Agent immediately.

Smoking shall not be permitted in those areas where it is a fire hazard. Such areas shall include fuel storage and refuelling areas, and any other areas where the vegetation or other materials are susceptible to the start and rapid spread of fire.

In terms of the National Environment Management: Air Quality Act, 39 of 2004 and Community Fire Safety By-law, burning is not permitted as a disposal method.

The Contractor shall appoint a Fire Officer (who may be the ESO) who shall be responsible for ensuring immediate and appropriate actions in the event of a fire and shall ensure that employees are aware of the procedure to be followed. The Contractor shall advise the relevant authority of a fire as soon as one starts and shall not wait until he can no longer control it. The Contractor shall forward the name of the Fire Officer to the Employer's Agent for his approval.

The Contractor shall comply with Clause 27 of the Construction Regulations, 2014 where applicable, and shall ensure that there is suitable and sufficient fire-fighting equipment available on Site at all times.

The Contractor shall be liable for any costs relating to the rehabilitation of burnt areas, should the fire be the result of the Contractor's activities on Site

The Contractor shall submit a Method Statement to the Employer's Agent covering the procedure to be followed in the event of a fire.

E5.9 Emergency procedures

The Contractor's attention is drawn to the Method Statements required in terms of Clauses E4.1 and E5.7 above. Such Method Statements shall include procedures to be followed by the Contractor in the event of an emergency.

Furthermore, in the event of an emergency the Contractor shall contact the City of Cape Town's Emergency Call Centre by telephoning 107 or 021 480 7700 (from a cell phone).Telephone numbers of emergency services, including the local fire fighting service, shall be posted conspicuously in the Contractor's office near the telephone.

E5.10 Health and safety

The Contractor shall comply with requirements of the Occupational Health and Safety Act, 85 of 1993 and Construction Regulations, 2014, the Health and Safety Specification and relevant clauses of GCC 2015, insofar as health and safety is concerned.

E5.11 Community relations

If so required, the Contractor shall erect and maintain information boards in the position, quantity, design and dimensions specified in the Scope of Work or as directed by the Employer's Agent. Such boards shall include contact details for complaints by members of the public in accordance with details provided by the Employer's Agent.

The Contractor shall keep a "Complaints Register" on Site. The Register shall contain all contact details of the person who made the complaint, and information regarding the complaint itself.

E5.12

E5.13 General protections in terms of the National Heritage Resources Act, 25 of 1999

The Contractor shall take cognisance of the provisions of the National Heritage Resources Act, 25 of 1999 in respect of, *inter alia*, structures older than 60 years; archaeology, palaeontology and meteorites; burial grounds and graves; and public monuments and memorials.

E5.14 Protection of natural features

The Contractor shall not deface, paint, damage or mark any natural features (e.g. rock formations) situated in or around the Site for survey or other purposes, unless agreed beforehand with the Employer's Agent. Any features affected by the Contractor in contravention of this clause shall be restored/ rehabilitated to the satisfaction of the Employer's Agent. The cost of restoration/rehabilitation shall be borne by the Contractor.

The Contractor shall not permit his employees to make use of any natural water sources (e.g. springs, streams, open water bodies) for the purposes of swimming, personal washing and the washing of machinery or clothes.

E5.15 Protection of flora and fauna

Except to the extent necessary for the carrying out of the Works, as specified by the Employer's Agent, no vegetation shall be removed, damaged or disturbed.

The presence of any wild animals found on Site shall be reported to the Employer's Agent, who shall issue an instruction with regard to their removal or relocation. If a wild animal needs removal from the Site the Cape Nature (Metro Region) Conservation Services Manager may be contacted for assistance (tel 021 955 9132/9121/3122/9130). Trapping poisoning, injuring or shooting animals is strictly forbidden. No domestic pets or livestock are permitted on Site, with the exception of controlled watchdogs approved by the Employer's Agent.

Where the use of herbicides, pesticides and other poisonous substances has been specified, the Contractor shall submit a Method Statement to the Employer's Agent for approval.

E5.16 Erosion and sedimentation control

The Contractor shall take all reasonable measures to limit erosion and sedimentation due to the construction activities and shall, in addition, comply with such detailed measures as may be required by the Scope of Work. Where erosion and/or sedimentation, whether on or off the Site, occurs, rectification shall be carried out in accordance with details specified by the Employer's Agent. Where erosion and/or sedimentation occur due to the fault of the Contractor, rectification shall be carried out to the reasonable requirements of the Employer's Agent, at the Contractor's cost. In particular, the Contractor shall ensure that the City's stormwater system is kept free from sediment arising from the Works.

Any runnels or erosion channels developed during the construction period or during the vegetation establishment period shall be backfilled and compacted, and the areas restored to a proper condition. Stabilisation of cleared areas to prevent and control erosion shall be pro-actively managed by the Contractor. The method of stabilisation shall be determined in consultation with the Employer's Agent.

E5.17 Aesthetics

The Contractor shall take any requisite measures to ensure that construction activities do not have an undue negative impact on the aesthetics of the area.

E5.18 Temporary site closure

In the event of temporary site closure (for a period exceeding one week), the Contractor's ESO shall carry out checks and ensure that, amongst others, the following conditions pertain and report on compliance with this clause:

a) Fire extinguishers are serviced and accessible.
b) There is adequate ventilation in enclosed spaces.
c) All hazardous substance stores are securely locked.
d) Fencing and barriers are in place.
e) Emergency and management contact details are prominently displayed and available.
f) Wind and dust mitigation measures, e.g. straw, brush packs, irrigation, etc. are in place.
g) Excavated and filled slopes and stockpiles are at a stable angle and capable of accommodating normal expected water flows.
h) There are sufficient detention ponds or channels in place.
i) Cement and materials stores are secured.
j) Toilets are empty and secured.
k) Central waste area and all refuse bins are empty and secured.
l) Contaminated water conservancy tank empty.

m) Any bunded areas are clean and treated with an approved product where applicable (e.g. Spill Sorb or Enretech #1 powder or equivalent).
n) Drip trays are empty and secure

E5.19 Asphalt and bitumen

Bitumen drums/products, if stored on Site, shall be stored in an area approved by the Employer's Agent. This area shall be indicated on the Method Statement for the Layout and Preparation of the Contractor's Camp. The storage area shall be constructed with an appropriate base, bunding and sump to the satisfaction of the Employer's Agent. A Method Statement shall be provided in this regard.

When heating bitumen products, the Contractor shall take cognisance of appropriate fire risk controls. Heating shall only be undertaken using LPG or similar zero emission fuels. Appropriate fire fighting equipment shall be readily available on Site.

E5.20 Dust

The Contractors shall be solely responsible, at his cost, for the control of dust arising from his activities on Site, and for any costs involved in damages resulting from the dust. The Contractor shall take all reasonable measures to minimise the generation of dust

E5.21 Contractor's advertising signage

Any advertising on the Site or any part of the Works shall remain at the sole discretion of the Employer, who reserves the right to order, via the Employer's Agent, its removal, covering or re-sizing, wherever placed, at no cost to the Employer.

Apart from at the Contractor's camp, no signage advertising the Contractor, or any of its subcontractors, manufacturers, suppliers or service providers shall be placed, fixed or erected anywhere on the Site or on the Works without the prior approval of the Employer's Agent. No advertising signage will be permitted on any designated scenic route. Notwithstanding any prior approval given, the Employer's Agent may instruct the Contractor to remove, cover or re-size any advertising signage at any time at no cost to the Employer.

Advertising signage at the Contractor's camp shall be appropriately designed and sized with due consideration to the surrounding environment, views and sight lines.

Branding or identification markings on the Contractor's and subcontractor's vehicles and equipment is generally permitted, although the Employer reserves the right to instruct, via the Employer's Agent, the removal, covering or re-sizing of any branding, markings or signage, on any equipment (scaffolding, for example), which it considers inappropriate in the environment in which it is placed.

No third party advertising (that is, in respect of any person, business or product that is not associated with the Works) shall be permitted anywhere on the Site or Works.

E5.22 Clearance of Site on completion

On completion of the Works, and at final completion when all defects have been remedied or corrected, the Contractor shall, in addition to the requirements for clearance of the Site in terms of the Contract, ensure that he has complied with the following requirements in terms of this EM Specification:

E5.22.1 Clause E3.1

Clean-up of improperly secured transported materials, and rehabilitation of storage areas.

E5.22.2 Clause E4.1.3

Remediation of hydrocarbon spill and leak areas.

E5.22.3 Clause E4.4

Disposal of litter, refuse and Contractor's waste.

E5.22.4 Clause E5.4

Removal of temporary fences and Contractor's camp.

E5.22.5
E5.22.6 Clause E5.5

Repair of access roads damaged by the Contractor, and rehabilitation of temporary access routes.

E5.22.7 Clause E5.7

Rehabilitation of burnt areas should a fire be the result of Contractor's activities on Site.

E5.22.8 Clauses E5.11 to 5.13

Rehabilitation of heritage and natural features, including vegetation which is damaged or disturbed, which required protection in terms of these clauses.

E5.22.9 Clause E5.14

Rectification where erosion and/or sedimentation has occurred due to the fault of the Contractor .

E5.22.10 Clause E5.19

Removal of Contractor's advertising signage.

E6 TOLERANCES

E6.1 Fines

Environmental management is concerned not only with the final results of the Contractor's operations, but also with the control of how these operations are carried out. Tolerance with respect to environmental matters applies not only to the finished product, but also to the standard of the day-to-day operations required to complete the Works.

It is thus required that the Contractor shall comply with the EM Specification on an on-going basis and any failure on his part to do so will entitle the Employer's Agent to certify the imposition of a fine. Fines may be issued per incident at the discretion of the Employer's Agent. Such fines will be issued in addition to any remedial costs incurred as a result of non-compliance with the environmental specifications. The Employer's Agent will inform the Contractor of the contravention and the amount of the fine, and will deduct the amount from monies due in payment certificates issued under the Contract.

Maximum fines for the following transgressions by either the Contractor and/or his sub-contractors may be imposed by the Employer's Agent, as follows:

		Maximum fine per incident
a)	Vehicles, plant or materials related to the Contractor's operations, parked or stored outside the demarcated boundaries of the Site.	R 2 000
b)	Persons, vehicles, plant or materials related to the Contractor's operations, found within the designated boundaries of a "no go" area.	R 4 000
c)	Persistent and unrepaired oil leaks from machinery/not using a drip tray to collect waste oil and other lubricants/not using specified absorbent material to encapsulate hydrocarbon spillage/using inappropriate methods of refuelling (the use of a funnel rather than a pump).	R 3 000
d)	Refuelling in areas not approved by the Employer's Agent.	R 3 000
e)	Litter on Site.	R 1 000
f)	Deliberate lighting of fires on Site.	R 5 000
g)	Individual not making use of the Site ablution facilities.	R 1 000
h)	Damage to trees not specified to be removed.	R 5 000
i)	Dust or excessive noise emanating from the site	R 1 000
j)	Not containing water contaminated with pollutants such as cement, concrete, fuel, etc.	R 2 000

For each subsequent similar offence the fine shall be doubled in value to a maximum value of R50 000.

E7 TESTING

Not applicable to this tender.

E8 MEASUREMENT AND PAYMENT

E8.1 Basic principles

Except where separate pay items have been measured in the Bills of Quantities, all costs in respect of complying with the EM Specification are deemed to be covered by the sum tendered for complying with the EM Specification.

ANNEXURE A: ENVIRONMENTAL METHOD STATEMENT

CONTRACT:……..... **DATE**:…...……

PROPOSED ACTIVITY (give title of method statement and reference number from the EMP):

WHAT WORK IS TO BE UNDERTAKEN (give a brief description of the works - attach extra information to ensure accurate description given):

WHERE THE WORKS ARE TO BE UNDERTAKEN (where possible, provide an annotated plan and a full description of the extent of the works):

START AND END DATE OF THE WORKS FOR WHICH THE METHOD STATEMENT IS REQUIRED:

Start Date:	End Date:

HOW THE WORKS ARE TO BE UNDERTAKEN (provide as much detail as possible, including annotated sketches and plans where possible):

Note: please give too much information rather than too little. Please ensure that issues such as emergency procedures, hydrocarbon management, wastewater management, access, individual responsibilities, materials, plant used, maintenance of plant, protection of natural features, etc. are covered where relevant

DECLARATIONS

1) EMPLOYER'S AGENT'S REPRESENTATIVE/ENVIRONMENTAL OFFICER/ENVIRONMENTAL CONTROL OFFICER

The work described in this Method Statement, if carried out according to the methodology described, appears to be satisfactorily mitigated to prevent avoidable environmental harm:

_____ _____

(signed) (print name)

Dated: _____

2) CONTRACTOR

I understand the contents of this Method Statement and the scope of the works required of me. I further understand that this Method Statement may be amended on application to other signatories and that the Employer's Agent's Representative/Environmental Officer/Environmental Control Officer will audit my compliance with the contents of this Method Statement. I understand that this method statement does not absolve me from any of my obligations or responsibilities in terms of the Contract.

_____ _____

(signed) (print name)

Dated: _____

3) EMPLOYER'S AGENT

The works described in this Method Statement are approved.

_____ _____ _____

(signed) (print name) (designation)

Dated: _____

ANNEXURE B: ENVIRONMENTAL SITE INSPECTION CHECKLIST
TO BE SUBMITTED TO THE EMPLOYER'S AGENT ONCE A WEEK

CONTRACT:…….... **DATE**:…..……

ENVIRONMENTAL ASPECT	YES/ NO (✓ or X)	COMMENTS
• All new personnel on Site are aware of the contents of the EMP and have been through the environmental awareness course.		
• Contractor's camp is neat and tidy and the labourers' facilities are of an acceptable standard.		
• Sufficient and appropriate fire fighting equipment is visible and readily available in the appropriate places.		
• Waste control and removal system is being maintained.		
• Fences are being maintained.		
• Drip trays are being utilised where there is a risk of spillage.		
• Bunded areas/drip trays are being emptied on a regular basis (especially after rain).		
• No leaks are visible from construction vehicles.		
• Refuelling of vehicles and plant occurs within designated areas, and appropriate refuelling apparatus and drip trays are being used.		
• "No go" areas, natural features, vegetation, etc. have not been damaged.		
• Dust control measures (if necessary) are in place and are effectively controlling dust.		
• Noise control measures (if necessary) are in place and are working effectively.		
• Erosion and sedimentation control measures (if necessary) are in place and are controlling effectively.		
• Material stockpiles are located within the boundary of the Site and are protected from erosion.		
• Other		

Completed by:…… Signed:……..…….....……

ENVIRONMENTAL MANAGEMENT DO'S AND DON'TS

Workers & equipment must stay inside the site boundaries at all times	Use the toilets provided Report full or leaking toilets
Do not swim in or drink from streams Do not throw oil, petrol, diesel, concrete or rubbish in the stream Do not work in the stream without direct instruction Do not damage the banks or vegetation of the stream	Only eat in demarcated eating areas Never eat near a river or stream Put packaging & leftover food into rubbish bins
Protect animals on the site Ask your supervisor or Contract's Manager to remove animals found on site	Do not litter - put all rubbish (especially cement bags) into the bins provided Report full bins to your supervisor The responsible person should empty bins regularly
Do not damage or cut down any trees or plants without permission Do not pick flowers	Always keep to the speed limit Drivers - check & report leaks Ensure loads are secure & do not spill
Put cigarette butts in a rubbish bin Do not smoke near gas, paints or petrol Do not light any fires without permission Know the positions of fire fighting equipment Report all fires Do not burn rubbish or vegetation without permission	Know all the emergency phone numbers
Work with petrol, oil & diesel in areas marked for this Report any petrol, oil & diesel leaks or spills Use a drip tray under vehicles & machinery Empty drip trays after rain & do not throw this water into a river	Fines of between R1000 and R5000 Removal from site Construction may be stopped
Try to avoid producing dust - wet dry ground & soil	Report any breaks, floods, fires, leaks and injuries to your supervisor Ask questions!
Do not make loud noises around the site, especially near schools and homes Report or repair noisy vehicles	

ANNEXURE D: ADDITIONAL ENVIRONMENTAL ISSUES DEEMED TO FORM PART OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

Listed below are issues pertaining to the environment that form part of the Contract Document. The clause references relate to the **General Conditions of Contract for Construction Works, Third Edition, 2015 (GCC 2015)**. They are listed here to emphasise that they form part of the environmental considerations and requirements for this project. They must be read together with any Contract Specific Data referring thereto in Part C1.2 Contract Data. The comments made below on the various issues are to be taken as explanatory, in so far as environmental matters are concerned, and do not modify the clauses in any way.

1. **Monitoring**

   Clause 3.1.1 makes provision for the Employer's Agent to administer the Contract in accordance with the provisions of the Contract, including the monitoring of any environmental variables.

2. **Health and safety**

   Clauses 3.1.4, 4.3.1, 4.3.2 and 4.10.1 remind the Contractor of his obligations in terms of the Occupational Health and Safety Act (No. 85 of 1993) and Construction Regulations 2014.

   Clause 5.7 of SANS 1200A reinforces these requirements through the observation of proper and adequate safety arrangements.

3. **Employer's Agent's authority to delegate**

   Clause 3.2.4 gives the Employer's Agent the authority to appoint a representative to act as the Environmental Officer (EO) for the Contract. The EO, who shall be responsible for monitoring compliance with the EMP, may be the Employer's Agent's Representative or any other person accountable to the Employer's Agent.

4. **Employer's Agent's instructions**

   Clause 4.2.1 requires that the Contractor comply with the Employer's Agent's instructions on any matter relating to the Works. Moreover, Clause 4.2.2 ensures that the Contractor only takes instructions from the Employer's Agent, the Employer's Agent's Representative or a person authorised by the Employer's Agent in terms of Clause 3.2.4.

5. **Compliance with applicable laws**

   Clause 4.3.1 requires that the Contractor comply with all applicable laws, regulations, etc. in fulfilling the Contract.

6. **Protection of fossils, etc.**

   Clause 4.7.1 requires the Contractor to take reasonable precautions to prevent any person from damaging, *inter alia* anything of geological or archaeological interest, and requires that he inform the Employer's Agent and follows any instructions issued in this regard.

7. **Housing, food and transport**

   Clause 4.10.1 requires the Contractor to make his own arrangements for payment, housing, feeding and transport for his employees, provided that if he uses any part of the Site for such purposes he shall obtain the Employer's Agent's prior approval.

   Clause 4.2 of SANS 1200A further requires that facilities provided comply with local authority regulations and are maintained in a clean and sanitary condition.

8. **Competent employees**

   Clause 4.11.1 requires that all persons employed on Site are careful, competent, and efficient. These attributes embrace knowledge of the environmental matters and issues dealt with in the EMP.

9. **Removal from Site**

   Clause 4.11.2 makes provision for the Employer's Agent to instruct the removal from the Works and Site of any person who is guilty of misconduct, or is incompetent or negligent, or is an undesirable presence on Site.

Clause 7.1.1 requires that all Construction Equipment be in good working order. Accordingly, the Employer's Agent may order that any Construction Equipment not complying with the environmental specifications be removed from Site.

10. **Unacceptable documentation**

Clauses 5.3.1 and 5.3.2 require the Contractor to provide documentation required before commencement with Works execution, failing which the Employer may terminate the Contract. Such documentation includes the Protection of the Environment Declaration provided for in the Contract Document.

11. **Programme and Method Statements**

Clause 5.6.1 makes provision for the Employer's Agent to request the programmes for carrying out the Works.

Clause 5.6.2 makes provision for the Employer's Agent to request statements from the Contractor for the entire scope of the work. In the case of the environmental specifications, these would be submitted as Method Statements.

12. **Hours of operation**

Clause 5.8.1 restricts the Contractors hours of operation to between sunrise and sunset on working days (usually from Monday to Saturday), unless, *inter alia,* permitted by the Employer's Agent in writing.

Clause 5.7.2 further requires that in the event that permission is granted for night work, then such work shall be carried out without excessive noise and disturbance.

13. **Suspension of Works**

Clause 5.11.1 enables the Employer's Agent to suspend the progress of the Works or any part thereof, which may be as a result of some default or breach of the Contract on the part of the Contractor.

14. **Site clean-up**

Clause 5.15.1 requires that, on completion of the Works, the Contractor shall clear away and remove from the Site all Construction Equipment, surplus materials, rubbish and Temporary Works of every kind and leave the whole of the Site and Works clean and in a safe condition. All streams and watercourses shall be restored to the condition as at the commencement of the Works. Should the Contractor fail to do the work upon notice from the Employer's Agent, the Employer may in terms of Clause 7.8.3, employ others to carry out the work and recover the cost of doing so from the Contractor.

15. **Access to the Works**

Clause 7.3.1 makes provision for the Employer's Agent to authorise the Environmental Officer (EO) to have access to the Works and Site.

16. **Pollution prevention and interferences**

Clause 8.1.2 requires that all operations necessary for the execution of the Works be carried out so as not to cause unnecessary noise or pollution, or to interfere unnecessarily or improperly with public services, or the access to, use and occupation of public or private roads and footpaths or properties.

Clause 5.6 of SANS 1200A further requires the Contractor to minimise dust nuisance and pollution of streams and inconvenience to or interference with the public.

17. **Dust**

Clause 8.1.2 requires that all operations necessary for the execution of the Works be carried out so as not to cause unnecessary pollution.

Clause 5.6 of SANS 1200A requires that the Contractor take all reasonable measures to minimise any dust nuisance.

18. **Noise**

Clause 8.1.2 requires that all operations necessary for the execution of the Works be carried out so as not to cause unnecessary noise.

Clause 4.1 of SANS 1200A requires that when working in built-up areas, the Contractor shall provide and use suitable and effective silencing devices for pneumatic tools and other plant that would otherwise cause a noise level exceeding 85dB.

19. **Protection of existing environment**

Clause 8.1.3 requires that the Contractor uses every reasonable means to prevent any roads or bridges to or in the vicinity of the Site being subjected to damage by excessive loads, or disruption due to excessive traffic, occasioned by his transport arrangements.

20. **Reinstatement**

Clauses 8.2 and 8.4 make provision for the Contractor to repair and make good any damage to the Works in his care (other than “excepted risks”), and bear any costs associated with such reinstatement.

21. **Reporting accidents**

Clause 8.5.1 requires the Contractor to report to the Employer’s Agent every occurrence on the Site which causes environmental damage.

H: HEALTH AND SAFETY SPECIFICATION

CONTENTS

H: HEALTH AND SAFETY SPECIFICATION

For use with the General Conditions of Contract for Construction Works, Third Edition, 2015.

H1 DEFINITIONS

For the purposes of this Specification, the definitions given in the Occupational Health and Safety Act, 85 of 1993 and the Construction Regulations, 2014, and the following definitions, shall apply:

a) "Construction Regulations, 2014" means the Construction Regulations (GNR. 84 of 7 February 2014) published in terms of the OHS Act.
b) "Contractor" means the Principal Contractor as defined in the Construction Regulations, 2014.
c) "Employer" means the Client or his agent as defined in the Construction Regulations, 2014.
d) "Employer's Agent" means the person/firm so named in the Contract Data whose function is to administer the Contract as agent of the Employer, acting through, if appointed, a Health and Safety Agent.
e) "OHS Act" means the Occupational Health and Safety Act, 85 of 1993.
f) "subcontractor" means any contractor employed by the Contractor to perform construction work.

H2 SCOPE

In terms of the OHS Act and the Construction Regulations, 2014 the Employer must provide the Contractor with a Health and Safety Specification, to which the Contractor must respond with a Health and Safety Plan for approval by the Employer.

The purpose of this Specification is to ensure that a contractor entering into a contract with the Employer maintains an acceptable level of compliance with regard to health and safety issues during the performance of the Contract. In this regard the Health and Safety Specification forms an integral part of the Contract and the Contractor shall ensure that his subcontractors and/or suppliers comply with the requirements of this Specification.

H3 INTERPRETATION

The OHS Act and its associated regulations shall have precedence in the interpretation of any ambiguity or inconsistency between it and this Specification.

Responsibility for health and safety relating to the Works lies with the Contractor as described in this Specification. Nothing stated in or omitted from this Specification shall in any way limit the Contractor's obligations and liabilities in terms of the OHS Act.

H4 GENERAL REQUIREMENTS

The Contractor shall:

a) create and maintain a safe and healthy work environment;
b) execute the Works in a manner that complies with all the requirements of the OHS Act and all its associated regulations, and in so doing, minimize the risk of incidents occurring; and
c) respond to the instructions issued by the Employer's Agent through the Employer's Agent's Representative, except in the case of a health and safety issue which requires the Contractor's immediate attention, in which case the Employer's Health and Safety Agent can issue an instruction directly to the Contractor.

H5 ADMINISTRATION

H5.1 Application for construction work permit

In terms of Regulation 3 of the Construction Regulations, 2014, read together with the exemptions published by the Department of Labour in Government Notice dated 7 July 2015, a client who intends to have construction work carried out, must at least thirty days before that work is to be carried out apply to the Provincial Director in writing for a construction work permit to perform construction work if the works contract is of a value exceeding one hundred and thirty million Rand (R130 000 000) or Construction Industry Development Board (CIDB) grading level 9. In such cases, the Employer's Agent will not issue an instruction to commence executing the Works, and the Contractor will not be permitted to commence with Works execution, until such time as the required construction work permit has been issued by the Provincial Director.

The employer will apply for the construction work permit as soon as possible after its Bid Adjudication Committee has awarded the contract based on the draft Health and Safety Plan submitted. Should the issuing of a construction work permit be delayed by the submission of a draft Health and Safety Plan which, in the opinion of either the Employer's Health and Safety Agent, or the Provincial Director of the Department of Labour, is unacceptable, no claim for an extension of time will be entertained.

The issuing of a construction work permit by the Department of Labour shall in no way nullify the requirement to submit a Health and Safety Plan to the Employer's Health and Safety Agent for discussion and approval (in terms of Clause H8.3 of this specification) before commencement with Works execution.

H5.2 Notification of intention to commence construction work

The Contractor shall notify the Provincial Director of the Department of Labour in writing using the pro forma contained in Annexure 2 of the Construction Regulations, 2014 before construction work commences, and retain a copy of such notification in the health and safety file, if such work will:

a) include excavation work;
b) include working at a height where there is a risk of falling;
c) include the demolition of a structure; or
d) include the use of explosives to perform construction work.

The Contractor shall ensure that no work commences on an electrical installation which requires a new supply or an increase in electricity supply before the person who supplies or contracts or agrees to supply electricity to that electrical installation has been notified of such work.

The Contractor shall ensure that no asbestos work is carried out before the Provincial Director of the Department of Labour has been notified in writing.

H5.3 Occupational Health and Safety Agreement

The Contractor shall enter into an Agreement with the Employer before the commencement of the Works on Site.

H5.4 Good standing with the Compensation Fund or a licensed compensation insurer

The Contractor shall provide the Employer's Agent with a letter of good standing from the Compensation Commissioner or a licensed compensation insurer before the commencement of the Works on Site.

H5.5 Emergency procedures

The Contractor shall submit for acceptance to the Employer's Agent a health and safety emergency procedure, which includes but is not limited to fire, spills, accidents and exposure to hazardous substances, which:

a) identifies the key personnel who are to be notified of any emergency;
b) sets out details of available emergency services, including contact particulars; and
c) the actions or steps which are to be taken during an emergency.

The Contractor shall within 24 hours of an emergency taking place notify the Employer's Agent in writing of the emergency and briefly outline what happened and how it was dealt with.

H5.6 Health and safety file

The Contractor shall ensure that a Health and Safety file, which shall include all documentation required in terms of the provisions of the OHS Act, the Construction Regulations, 2014 and this Health and Safety Specification, is open and kept on Site at all times.

The Health and Safety file shall be made available for inspection by any inspector, subcontractor, the Employer, the Employer's Agent, the Employer's Health and Safety Agent, or employee of the Contractor, upon the request of such persons.

The Contractor shall hand over the Health and Safety file to the Employer's Agent upon Works completion of the Contract and, if applicable, a certificate of compliance accompanied by a test report for the electrical installation in accordance with the provisions of the Electrical Installation Regulations, 1992.

H5.7 Health and safety committee

Where applicable, the Contractor shall establish a health and safety committee, and shall convene health and safety meetings as provided for in the OHS Act.

The Employer's Agent or the Employer's Health and Safety Agent shall be invited to attend such meetings as an observer.

The Contractor shall ensure that minutes of the health and safety committee meetings are kept.

H5.8 Inspections, formal enquires and incidents

The Contractor shall inform the Employer's Agent:

a) beforehand of inspections, investigations or formal inquiries of which he has been notified by an inspector; and
b) as soon as reasonably practicable of the occurrence of an incident (as defined in the OHS Act) on the Site.

The Contractor shall record all incidents and notify the Employer's Agent of any incident, except in the case of a traffic accident on a public road, as soon as possible after it has occurred and report such incident to an inspector as designated in terms of the OHS Act.

The Contractor shall investigate all incidents and issue the Employer's Agent with copies of such investigations.

H5.8 Personal protective equipment and clothing

The Contractor shall ensure that all workers are issued with the necessary personal protective clothing.

H6 APPOINTMENTS

H6.1 Appointment of construction manager

The Contractor shall, prior to commencing the Works on Site, appoint a full-time competent person as the construction manager, with the duty of managing all construction work on a single site, including the duty of ensuring occupational health and safety compliance. In the absence of the construction manager an alternative must be appointed by the Contractor.

The Contractor may, having considered the size of the project, appoint, in writing, one or more assistant construction managers for different sections thereof.

No construction manager may manage any construction work on or in any construction site other than the Site in respect of which he or she has been appointed.

H6.2 Appointment of construction supervisor, and health and safety officers

The construction manager shall appoint a competent employee(s) in writing as the construction supervisor(s) for the Site, who will be responsible for construction activities and ensuring occupational health and safety compliance on the construction site. The Contractor may, having considered the size of the project, appoint, in writing, one or more competent employees to assist the appointed construction supervisor(s).

The Contractor may, having considered the size of the project, the degree of danger likely to be encountered or the accumulation of hazards or risks on the Site, appoint a full-time or part-time construction health and safety officer in writing, who has in the Contractor's opinion the necessary competencies and resources, to assist the Contractor in the control of all health and safety related aspects on the Site.

The Contractor shall compile an maintain an organogram which outlines the roles and responsibilities of the construction supervisor's assistants, and health and safety officers.

H6.3 Other competent persons

The Contractor shall appoint in writing competent persons to supervise or inspect, as relevant, any of the following:

a) temporary works operations;
b) excavation work;
c) demolition work;
d) scaffolding work operations;
e) suspended platform work operations;
f) rope access work;
g) material hoists;
h) operation of bulk mixing plant;
i) explosive activated fastening device;
j) cranes;
k) construction vehicles and mobile plant (equipment);
l) the stacking and storage of articles on the Site; and
m) fire equipment.

The Contractor shall appoint in writing competent persons to:

l) induct employees in health and safety; and
m) prepare a fall protection plan.

H6.4 Health and safety representative(s)

The Contractor shall appoint in writing, if necessary in terms of the OHS Act, a health and safety employee representative(s), whose duties shall be as described in the OHS Act.

H7 EMPLOYER'S HEALTH AND SAFETY AGENT

The Employer's Health and Safety Agent shall:

a) audit the Contractor's compliance with the requirements of this Specification prior to the commencement of any physical construction activities on the Site;
b) accept or reject all safety plans, giving reasons for rejecting such plans;
c) monitor the effective implementation of all safety plans;
d) conduct periodic and random audits on the health and safety file to establish compliance with the requirements of this Specification and the Contractor's health and safety plan; and
e) visit the site at regular intervals to conduct site inspections, and based upon such visits issue, wherever necessary, any notices and/or instructions to the Contractor or any of the Contractor's subcontractors with a copy to the Employer's Agent and, where relevant, to the Contractor.

The Contractor shall invite the Employer's Health and Safety Agent to audit compliance with the requirements of this Specification before commencing with any new construction activity on the Site.

The Contractor shall permit the Employer's Health and Safety Agent to audit the Contractor's compliance with the approved Health and Safety Plan, and shall provide any assistance and/or documentation as may be required in this regard.

H8 CREATING AND MAINTAINING A SAFE AND HEALTHY WORK ENVIRONMENT

H8.1 General

The Contractor shall with respect to the Site and the construction works that are contemplated:

a) cause a preliminary hazard identification to be performed by a competent person before commencing any physical construction activity;
b) evaluate the risks associated with such work constituting a hazard to the health and safety of such employees and the steps that need to be taken to comply with the OHS Act; and
c) as far as is reasonably practicable, prevent the exposure of such employees to the hazards concerned or, where prevention is not reasonably practicable, minimize such exposure.

The Contractor shall ensure that:

d) all reasonably practicable steps are taken to prevent the uncontrolled collapse of any new or existing structure or any part thereof, which may become unstable or is in a temporary state of weakness or instability due to the carrying out of construction work;
e) no structure or part of a structure is loaded in a manner which would render it unsafe;
f) relevant information, if any, provided by the designer of the structure is taken into account in the risk assessment; and
g) the designer of any temporary works complies with the requirements of regulation 6(2) of Construction Regulations, 2014.

The Contractor shall carry out regular inspections and audits to ensure that the Works are being performed in accordance with the requirements of this Specification and the Contractor's health and safety plan.

H8.2 Risk assessment

The Contractor shall before the commencement of any construction work on Site and during such construction work, cause risk assessment(s) to be performed by a competent person appointed in writing. Such assessment(s) shall as a minimum:

a) identify the risks and hazards to which persons may be exposed to;
b) analyse and evaluate the identified risks and hazards based on a documented method;
c) document a plan of safe work procedures, including the use of any personal protective equipment or clothing and the undertaking of periodic "toolbox talks" or inductions before undertaking hazardous work, in order to mitigate, reduce or control the risks and hazards that have been identified;
d) provide a monitoring plan; and
e) provide a review plan.

The Contractor shall ensure that as far as is reasonably practicable, ergonomic related hazards are analysed, evaluated and addressed in the risk assessment.

The Contractor must review the relevant risk assessment -

f) where changes are effected to the design and or construction that result in a change to the risk profile; or
g) when an incident has occurred.

H8.3 Health and safety plans

The Contractor shall prior to commencing the Works to which this Specification applies, submit to the Employer's Health and Safety Agent for approval a suitable and sufficiently documented health and safety plan, based on this Specification and the risk assessment that is conducted.

The health and safety plan shall include, but not be limited to, the following:

a) The safety management structure, including the names of all designated persons such as the construction supervisor and any other competent persons;
b) Safety method statements and procedures to be adopted to ensure compliance with the OHS Act; Construction Regulations, 2014 and this Health and Safety Specification;
c) The provision and use of temporary services;
d) Personal protective equipment, devices and clothing required;
e) Emergency procedures;
f) Provision of workers' welfare facilities;

g)
h) Induction and training;
i) Arrangements for monitoring and control to ensure compliance with the safety plan; and
j) Provision and maintenance of the health and safety file and all other relevant documentation.

The Contractor shall provide each subcontractor with the sections of this Health and Safety Specification pertaining to the construction work to be performed by that subcontractor. The subcontractor shall provide the Contractor with a health and safety plan pertaining to his work, for incorporation into the Contractor's health and safety plan.

The Contractor shall discuss the submitted health and safety plan with the Employer's Health and Safety Agent, modify such plan in the light of the discussions and resubmit the modified plan for approval.

The Contractor shall apply the approved health and safety plan from the date of its approval and for the duration of the Works to which this Specification applies.

The Contractor shall conduct periodic audits for compliance with the approved health and safety plan at intervals agreed upon with the Employer's Health and Safety Agent, but at least once every month.

The Contractor shall update the health and safety plan whenever changes to the Works are brought about.

H8.4 Responsibilities towards employees and visitors

The Contractor shall, as far as is reasonably practicable, cause every employee to be made conversant with the hazards to his health and safety attached to any work which he has to perform, any article or substance which he has to produce, process, use, handle, store or transport and any plant or machinery which he is required or permitted to use, as well as with the precautionary measures which should be taken and observed with respect to those hazards or safe work procedures.

The Contractor shall ensure that all employees under his 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 Contractor shall cause a record of all induction training to be kept, which indicates the names, identity numbers and job description of all those who attended such training.

The Contractor shall not allow or permit any employee to enter the 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 Contractor shall ensure that all of his employees have a valid medical certificate of fitness specific to the construction work to be performed and issued by an occupational health practitioner on the prescribed form.

The Contractor shall ensure that each visitor to the Site, save where such visitor only visits the site office and is not in direct contact with the construction work activities:

a) undergoes health and safety instruction pertaining to the hazards prevalent on the Site; and
b) is in possession of and using the necessary personal protective equipment.

The Contractor shall cause a record of all induction training to be kept in the Health and Safety file.

The Contractor shall provide suitable on-site signage to alert workers and visitors to health and safety hazards and requirements. Such signage shall include but not be limited to:

c) prohibited unauthorized entrance;
d) signage to indicate what personal protective equipment is to be worn; and
e) activity related signs.

The Contractor shall not permit any person who is or who appears to be under the influence of intoxicating liquor or drugs, to enter or remain at a workplace.

H8.5 Subcontractors

The Contractor may only subcontract work in terms of a written subcontract and shall only appoint a subcontractor should he be reasonably satisfied that such a subcontractor has the necessary competencies and resources to safely perform the work falling within the scope of the subcontract.

The Contractor shall ensure that all of his obligations in respect of subcontractors in terms of the Construction Regulations, 2014 are adhered to.

H8.6 Work permits and wayleaves

The Contractor shall be responsible for obtaining all the wayleaves, permissions or permits applicable to working near any existing services or other infrastructure on Site, and shall abide by the safety conditions imposed by such wayleaves, permissions or permits.

H8.7 Access to the Site

The Contractor shall ensure that access to the Site is strictly controlled and that, where possible, only authorised persons are permitted onto the Site.

The Contractor shall control the access to Site of his own personnel and equipment, and that of his subcontractors and suppliers, in such a way so as to ensure that the safety of all public pedestrian and vehicular traffic is not compromised.

H8.8

H8.9 First aid and emergency procedures

The Contractor shall, where more than five employees are employed at a workplace, provide a first aid box or boxes at or near the workplace, which shall be available and accessible for the treatment of injured persons at that workplace. Such first aid boxes shall contain suitable first aid equipment.

The Contractor shall ensure, where there are more than 10 employees employed on the Site, that for every group of up to 50 employees at that workplace at least one person is readily available during normal working hours who is in possession of a valid certificate of competency in first aid.

The following information shall be conspicuously posted in the offices of the Contractor for the duration of the Contract:

a) Telephone numbers of emergency services;
b) The names of all safety representatives and safety officers; and
c) The name(s) of the competent first aider(s).

The Contractor shall post, in prominent places, notices indicating where the first aid box(es) is/are kept, as well as the name of the person in charge of the first aid box.

H8.10 Housekeeping

The Contractor shall ensure, *inter alia*, that suitable housekeeping is continuously implemented on the Site, including provision for the:

a) removal of scrap, waste and debris, and materials which are no longer required for use, at appropriate intervals (in accordance with Construction Regulation 27); and
b) proper stacking and storage of materials and equipment (in accordance with Construction Regulations 27 and 28).

H8.11 Fire precautions

The Contractor shall ensure that all appropriate measures are taken to minimize the risk of fire and that appropriate procedures and equipment are in place to deal with the event of a fire, all in accordance with Construction Regulation 29 and the Environmental Management Specification in Part C3.5 of the Scope of Work.

H8.12 Facilities for workers

The Contractor shall provide ablution facilities and eating areas all as specified in the Environmental Management Specification in Part C3.5 of the Scope of Work.

H9 GENERAL HAZARDS AND RISKS APPLICABLE TO WORK REQUIRED IN TERMS OF THIS TENDER

H9.1 Existing Site conditions

H9.2 Information provided by the designer (CR 6(1))

H9.3 Environmental hazards

H9.4 Traffic hazards

H9.5 Construction materials (hazardous substances)

H9.6 Fall protection (working at heights) (CR 10)

H9.7 Structures (CR 11)

H9.8 Temporary works (CR 12)

H9.9 Excavation work (CR 13)

H9.10 Demolition work (CR 14)

H9.11 Tunneling (CR 15)

H9.12 Scaffolding (CR 16)

H9.13 Suspended platforms (CR 17)

H9.14 Rope access work (CR 18)

H9.15 Material hoists (CR 19)

H9.16 Bulk mixing plant (CR 20)

H9.17 Explosive actuated fastening device (CR 21)

H9.18 Cranes (CR 22)

H9.19 Construction vehicles and mobile plant (equipment) (CR 23)

H9.20 Electrical installations and machinery (CR 24)

H9.21 Flammable liquids (CR 25)

H9.22 Water environments (CR 26)

H9.23 Overhead Work (CR 27(g))

H9.24 Confined spaces

H9.25 Other hazards…

C3.6 Annexes

CONTENTS

ANNEX 1

CITY OF CAPE TOWN
MONTHLY PROJECT LABOUR REPORT

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

Instructions for completing and submitting forms

General

1 The Monthly Project Labour Reports must be completed in full, using typed, proper case characters; alternatively, should a computer not be available, handwritten in black ink.
2 Incomplete / incorrect / illegible forms will not be accepted.
3 Any conditions relating to targeted labour stipulated in the Contract (in the case of contracted out services or works) shall apply to the completion and submission of these forms.
4 This document is available in Microsoft Excel format upon request from the City's EPWP office, tel 021 400 9406, email EPWPLR@capetown.gov.za.

Project Details

5 If a field is not applicable insert the letters: NA
6 Only the Project Number supplied by the Corporate EPWP Office must be inserted. The Project Number can be obtained from the Coordinator or Project Manager or from the e-mail address in point 4 above.
7 On completion of the contract or works project the anticipated end date must be updated to reflect the actual end date.

Beneficiary Details and Work Information

8 Care must be taken to ensure that beneficiary details correspond accurately with the beneficiary's ID document.
9 A new beneficiary is one in respect of which a new employment contract is signed in the current month. A certied ID copy must accompany this labour report on submission.
10 Was the beneficiary sourced from the City's job seeker database?
11 The contract end date as stated in the beneficiary's employment contract.
12 Where a beneficiary has not worked in a particular month, the beneficiary's name shall not be reflected on this form at all for the month in question.
13 Training will be recorded separately from normal working days and together shall not exceed the maximum of 23 days per month
14 Workers earning more than the maximum daily rate (currently R450 excluding any benefits) shall not be reflected on this form at all.

Submission of Forms

15 Signed hardcopy forms must be scanned and submitted to the City's project manager in electronic (.pdf) format, together with the completed form in Microsoft Excel format.
16 Scanned copies of all applicable supporting documentation must be submitted along with each monthly project labour report. Copies of employment contracts and ID documents are only required in respect of new beneficiaries.
17 If a computer is not available hardcopy forms and supporting documentation will be accepted.

PROJECT DETAILS

Numbers in cells below e.g (6) refer to the relevant instruction above for completing and submitting forms

CONTRACT OR WORKS PROJECT NAME: (6)		EPWP SUPPLIED PROJECT NUMBER: (6)	
DIRECTORATE:		DEPARTMENT:	
CONTRACTOR OR VENDOR NAME:		CONTRACTOR OR VENDOR E-MAIL ADDRESS:	
CONTRACTOR OR VENDOR CONTACT PERSON:		CONTRACTOR OR VENDOR TEL. NUMBER:	CELL WORK

PROJECT LABOUR REPORT CURRENT MONTH (mark with "X")

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR

ACTUAL START DATE (yyyy/mm/dd)	ANTICIPATED / ACTUAL END DATE (yyyy/mm/dd) (7)
TOTAL PROJECT EXPENDITURE / VALUE OF WORK DONE TO-DATE (INCLUDING ALL COSTS, BUT EXCLUDING VAT)	
R	

ANNEX 1 (continued)

MONTHLY PROJECT LABOUR REPORT

BENEFICIARY DETAILS AND WORK INFORMATION

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

CONTRACT OR WORKS PROJECT NUMBER:		Year	Month	Sheet		
				1	of	

	(8)	(8)	(8)	(9)			(10)		(11)	(12)	(13)	(14)
No.	First name	Surname	ID number	New Beneficiary (Y/N)	Gender (M/F)	Disabled (Y/N)	Job seeker database (Y/N)	Contract start date (DDMMYY)	Contract end date (DDMMYY)	No. days worked this month (excl. training)	Training days	Rate of pay per day (R – c)
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
										0	0	R -

Declared by Contractor or Vendor to be true and correct:	Name		Signature	
	Date			

Received by Employer's Agent / Representative:	Name		Signature	
	Date			

ANNEX 2

CITY OF CAPE TOWN

CONTRACT NO. AND NAME: .....

CONTRACTOR: .....

B-BBEE SUB-CONTRACT EXPENDITURE REPORT BASED ON PAYMENT CERTIFICATE NO. .....

Value of the contract (as defined in the **Preference Schedule**) (**P***)	R	B-BBEE Status Level of Prime Contractor	

Name of Sub-contractor (list all)	**B-BBEE Status Level of Sub-contractor[1]**	**Total value of Sub-contract (excl. VAT)[1]**	**Value of Sub-contract work to date (excl. VAT)[1]**	**Value of Sub-contract work to Sub-contractors with a lower B-BBEE Status Level than Prime Contractor**
Sub-contractor A		R	R	R
Sub-contractor B		R	R	R
Sub-contractor C		R	R	R
			Total:	R
			Expressed as a percentage of **P***	%

[1]Documentary evidence to be provided

Signatures

Declared by Contractor to be true and correct: ..... **Date:** .....

Verified by Employer's Agent/ Employer's Agent's Representative: ..... **Date:** .....

ANNEX 3

CITY OF CAPE TOWN

CONTRACT NO. AND NAME: .....

CONTRACTOR: .....

JOINT VENTURE EXPENDITURE REPORT BASED ON PAYMENT CERTIFICATE NO. .....

Value of the contract (as defined in the **Preference Schedule**) (**P***)	R	B-BBEE Status Level of Joint Venture	

Name of Joint Venture partner (list all)	B-BBEE Status Level of each JV partner as at contract award	Percentage contribution of JV partner per JV Agreement[1] A	Total value of JV partner's contribution (excl. VAT)[1] B = A% x P*	Value of JV partner's contribution to date (excl. VAT)[1] C	Value of JV partner's contribution as a percentage of the work executed to date D = C/P*x100
JV Partner A		%	R	R	%
JV Partner B		%	R	R	%
JV Partner C		%	R	R	%

[1]Documentary evidence to be provided

Signatures

Declared by Contractor to be true and correct: ..... **Date:** .....

Verified by Employer's Agent/ Employer's Agent's Representative: ..... **Date:** .....

ANNEX 4

CITY OF CAPE TOWN

CONTRACT NO. AND NAME: .....

CONTRACTOR: .....

TARGETED LABOUR CONTRACT PARTICIPATION EXPENDITURE REPORT BASED ON CERTIFICATE NO. .....

Value of the contract (as defined in the **Preference Schedule**) (**P***)	R

Specified Targeted Labour Contract Participation Goal	%

Name of Contractor/Sub-contractor (list all)	**Total previous expenditure on wages in respect of targeted labour**	**Net Amount for this month[1]**	**Total expenditure on wages in respect of targeted labour**
Contractor	R	R	R
Sub-contractor A	R	R	R
Sub-contractor B	R	R	R
		Total:	R
		Expressed as a percentage of **P***	%

[1]Documentary evidence to be provided

Signatures

Declared by Contractor to be true and correct: ..... **Date** .....

Verified by Employer's Agent/ Employer's Agent's Representative: ..... **Date** .....

ANNEX 5 CITY OF CAPE TOWN

CONTRACT NO. AND NAME: .....

CONTRACTOR: .....

TARGETED ENTERPRISES CONTRACT PARTICIPATION EXPENDITURE REPORT BASED ON CERTIFICATE NO. .....

Value of the contract (as defined in the **Preference Schedule**) (**P***)	R

Specified Targeted Enterprises Contract Participation Goal	%

Name of targeted enterprise (list all)	**Total previous expenditure (excl. VAT) to targeted enterprises**	**Net Amount for this month[1]**	**Total expenditure (excl. VAT) to targeted enterprises**
Targeted Enterprise A	R	R	R
Targeted Enterprise B	R	R	R
Targeted Enterprise C	R	R	R

[1]Documentary evidence to be provided

Total:	R
Expressed as a percentage of **P***	%

Signatures

Declared by Contractor to be true and correct: ..... **Date** .....

Verified by Employer's Agent/ Employer's Agent's Representative: ..... **Date** .....

Part C4: Site information and Drawings

CITY OF CAPE TOWN

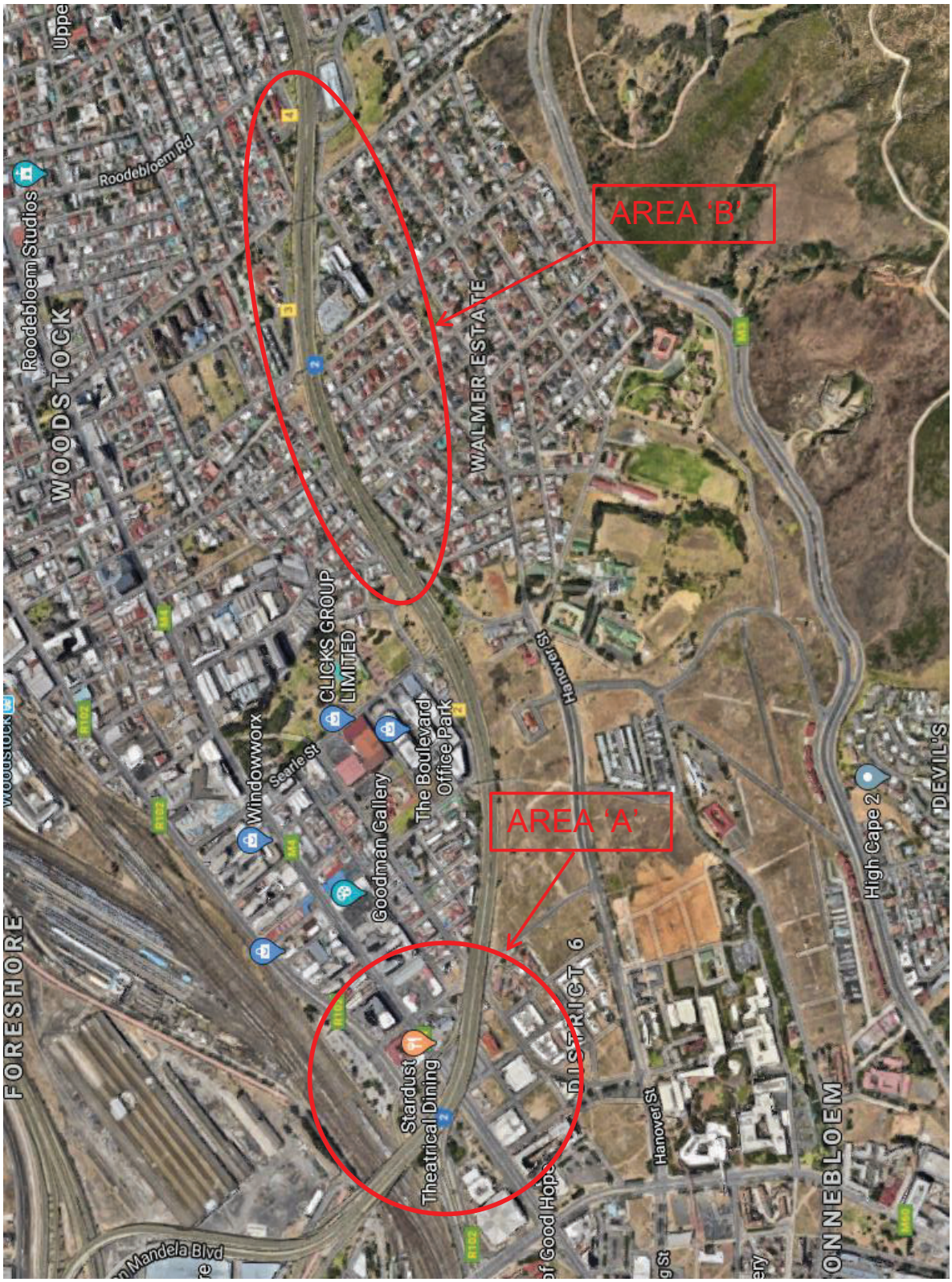
TRANSPORT ROADS INFRASTRUCTURE & MANAGEMENT: INFRASTRUCTURE & SYSTEMS: STRUCTURES SECTION

CONTRACT NO. 309Q/2019/20

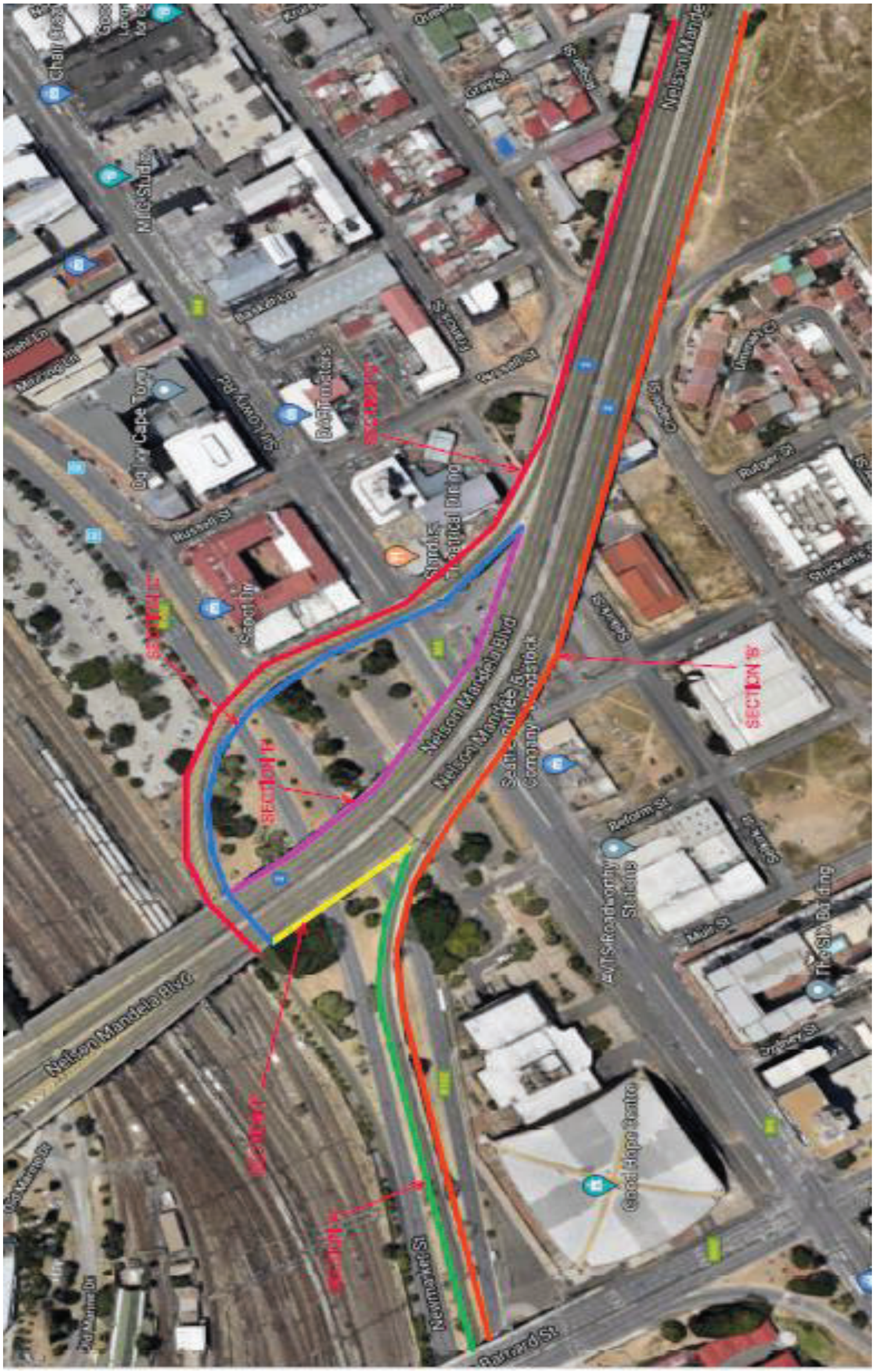
PROJECT REHABILITATION OF EXISTING BALUSTRADES ON NELSON MANDELA BOULEVARD

C4.1 Site Information

Locality and Aerial Photography

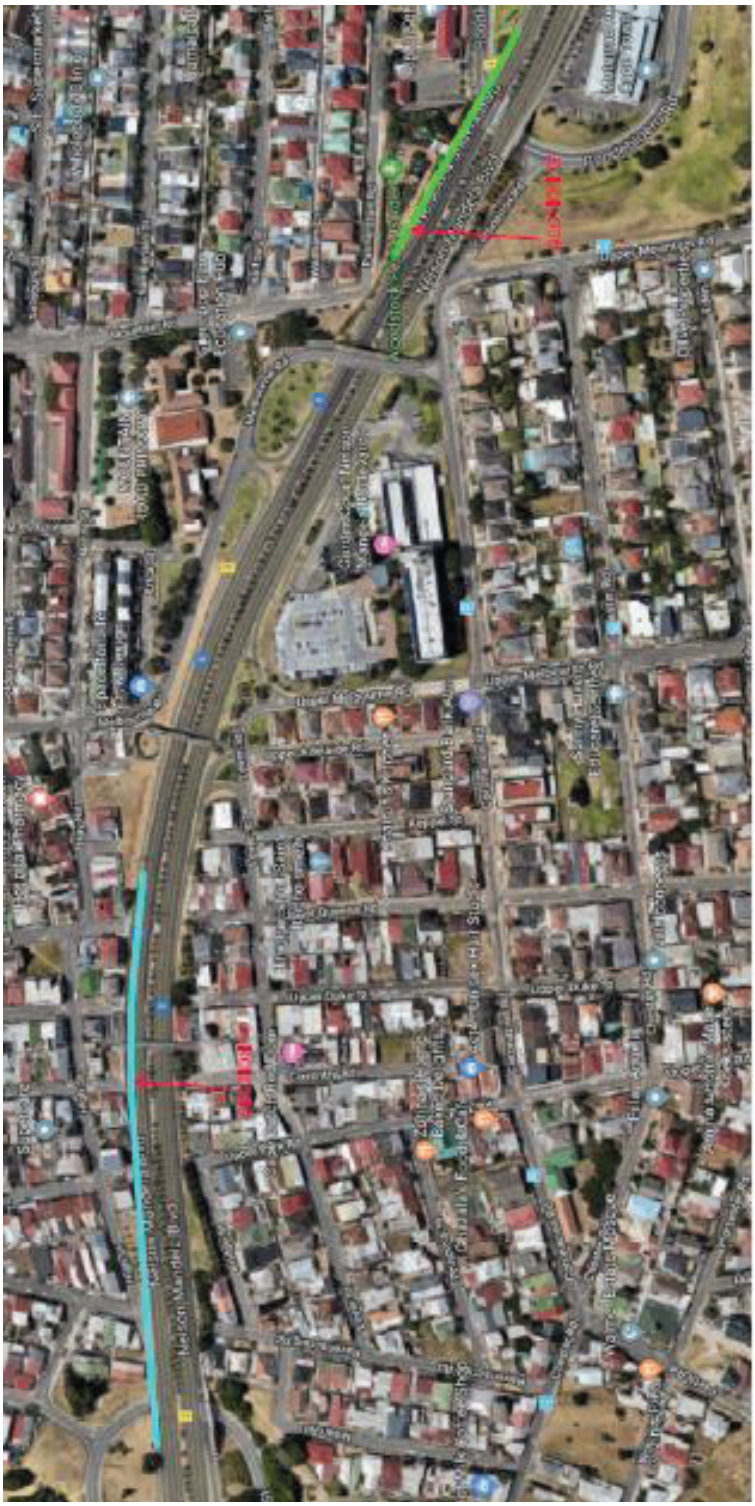


OVERALL PROJECT KEY PLAN



EXPANDED PLAN ON AREA 'A'

INDICATING THE EXTENT OF BALUSTRADES & WALLS WHICH NEEDS TO BE REHABILITATED



EXPANDED PLAN ON AREA 'B'

INDICATING THE EXTENT OF BALUSTRADES & WALLS THAT NEEDS TO BE REHABILITATED

C4.2 Drawings:

List of drawings:

REFER TO VOLUME 4: Reduced book of drawings